The Electrical Industry's Weekly Magazine

January 16, 1956

Electrical World

Price 35 Cents

A McGraw-Hill Publication

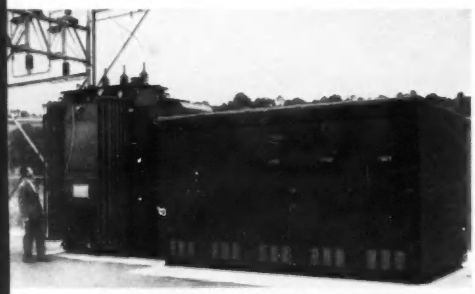
. . . . . Page 16

Checking New York's Bad Wiring Epidemic . . . Page 30

E B POWER GS W 12
UNIVERSITY MICROFILMS IN
313 N 1 ST
ANN ARBOR MICH

LANDSCAPING PLANS are reviewed for G.E.'s new booklet by E. M. Hunter (left), Electric Utility Engineer; J. C. Page (right), Manager—Product Planning for Medium Voltage Switchgear Dept.; and artist John Watrous. The booklet shows planting arrangements which allow utilities to accommodate residential areas with inconspicuous unit substations.

INTELLIGENT PLANTING OF SHRUBS which blend with those of the community can keep substations almost completely out of sight, helping to preserve local good will.



LOW AND COMPACT DESIGN makes this General Electric unit substation easy to install close to residential load and particularly easy to landscape for neighborhood acceptance.

Landscaping can help utilities...

MAKE SUBSTATIONS GOOD NEIGHBORS

. . . The economical way to good distribution and healthy public relations

Distribution losses can be whittled substantially and systems costs reduced when unit substations are installed closer to the residential load. But, this obvious step in improving distribution involves a ticklish public relations problem.

COMMUNITY APPROVAL NEEDED

By making substations more attractive, or at least less conspicuous, system planners find that the substation can be socially acceptable—allowing utilities to take advantage of proximity to load and improve local good will.

LANDSCAPING COSTS LITTLE

Landscaping substations is far less expensive than housing. Even the problem of concealing steel structures can be solved if towers are low and if terrain is graded up to substation fences and evergreens are planted at the top.

HOW TO DO IT

To help you to economically serve increasing residential load and meet community approval, General Electric engineers are keeping substation designs clean and functional. And, G.E. has prepared a new booklet which shows how landscaping may be done attractively and at minimum cost.

To get your copy write for GED-2403 to the General Electric Company, Section 301-291, Schenectady 5, N. Y.

MORE POWER TO AMERICA

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Electrical World

Published for 82 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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• • •

COMING NEXT WEEK—Electrical World's 52nd Annual Report on the Electrical Industry. This will be the first complete report of the industry's activities in 1955.

This is a rod designed to prevent conductors from swinging together mid-span.

As loads on many transmission and subtransmission systems have increased, it has become steadily more important to prevent conductors from making contact mid-span, either from wind swaying or the magnetic effects of short circuits.

To solve this growing problem, one of the larger electric companies some time ago turned to Lapp. The result is this simple porcelain rod (made in various lengths for various conductor spacing). It is grooved at each end, to provide for attachment to conductors by ordinary tie-wire practice.

Lapp's contribution to this situation was immediate recognition of the problem involved, enthusiastic willingness to do something useful about it, and prompt performance once the decision was made. We like to believe that this type of alert and aggressive helpfulness is the spirit of the entire Lapp organization. It may be one of the reasons why so many users of insulators and high-voltage porcelain rely on Lapp, for their special—and regular—requirements.

Lapp Insulator Co., Inc., Le Roy, N. Y.

Lapp

EDITORIALS

The Westinghouse Strike

The strike that for nearly three months has shut down the bulk of production at Westinghouse Electric Corp's plants is of major concern to everyone in the electrical industry. It means that supply lines are down on 25% of the productive capacity for most major lines of electrical apparatus. It means loss of appliance production at a time when sales in that field are at record highs.

Issues involved in the strike reach far beyond the plants and headquarters of Westinghouse. They reach even beyond other manufacturers who must deal with the same unions. The basic wage scale, which will ultimately be reflected in prices, is at stake. The stability of both production and prices is at stake.

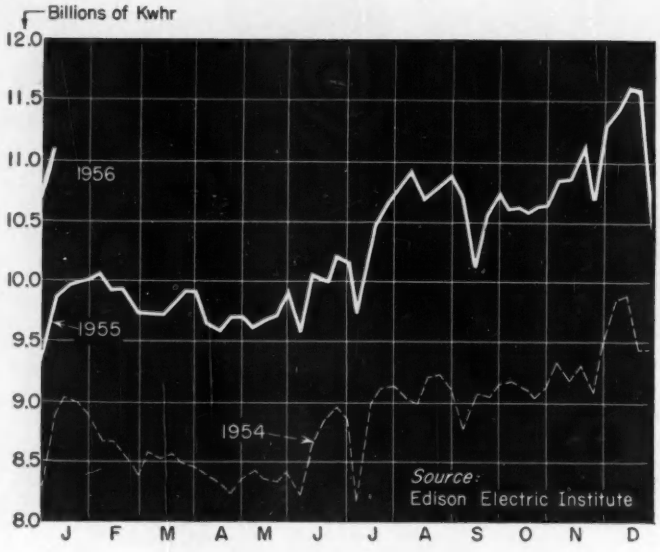
Utilities are understandably disturbed over the delivery of essential equipment. This urgency is bound to increase as they evaluate the significance of the unusual winter peaks that carried industry loads over 100 million kw. But they are concerned, too, over the stability of labor costs and resultant prices.

It is fortunate that the financial position of the company is such that it can take a firm stand on the issues involved. It is fortunate, too, that utilities and other segments of the industry have almost universally supported Westinghouse management in this critical struggle. With this continued support, Westinghouse management can solve its problems.

We hope that a settlement will come soon. At the same time we realize that it must be one that preserves the principles which are essential for the long range health and strength of the entire industry.

For an up-to-the-minute report on how the strike is affecting production of utility apparatus and equipment, turn to page 8.

ELECTRICAL WEEK



OUTPUT

Week Ended Jan. 7
11,057,000,000 Kwhr
Up 12.4%

Atomic Energy Commission requirements — 1,125,000,000 kwhr (Electrical World estimate). Excluding AEC, output increase was 7.2%

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
Jan. 7	+12.4	+7.3	+4.9	+18.7	+5.8	+18.2	+8.3	+8.4	+15.8	+4.1
Dec. 31	+14.1	+11.0	+9.8	+21.3	+8.3	+15.3	+10.7	+10.5	+15.2	+6.9
Dec. 24	+23.1	+20.3	+17.4	+32.9	+19.0	+21.7	+20.2	+19.5	+23.9	+17.5

Seasonally Adjusted Index 210.5 Week Ago 210.0 Year Ago 180.3

Issue's Highlights—Westinghouse's top apparatus officials tell how strike will affect customers . . . EEI shapes up its new wiring promotion program . . . President Eisenhower for first time endorses partnership approach to Oregon's John Day Project in State of Union message . . . Puget Sound P&L announces partnership agreement on new project . . . N. Y. Power Authority Chairman Robert Moses and Sen Herbert Lehman (D–N. Y.) clash over legal opinion involving Niagara treaty reservation . . . England's power capacity tops demand as expansion program continues.

New England Council—A council of New England electric utilities is being organized to encourage wider participation of staff employees in varied industry activities. First meeting is scheduled this month to elect officers.

New Officers—Albert G. Neal has been elected president of Fitchburg (Mass.) G&E, succeeding Frank S. Clifford, retired . . . C. T. Bremicker, Northern State Power vice president, has been elected chairman of National Adequate Wiring Bureau's executive committee, succeeding C. C. Walker, GE commercial vice president.

Colorado Acts—Gov Ed C. Johnson has asked Colorado Legislature to appropriate $50,000 for an "educational fund" to counteract "a vicious campaign of injurious propaganda" against the Upper Colorado River Development Project. Johnson urged that "not one cent would be available to support any bill in Congress that does not give Colorado full and complete equity in development of water" of river.

Florida Cold—All-time peaks and some distribution troubles resulted last week when Florida was hit by cold weather. Florida P&L, with capability of 890 Mw, reported load of 926 Mw—the difference being made up through interconnections. Crews worked around clock to replace transformer fuses and burned out transformers. Tampa Electric, with capability of 310 Mw, had a 309 Mw peak, 19.8% above 1955 high. One distribution breaker opened and a line fuse and a number of distribution transformer fuses blew. Florida Power fared better, experiencing load of 503 Mw against capability of 539 Mw. Peak was 13.9% above last January's high.

NEWS OF THE INDUSTRY BRIEFLY TOLD

Washington Wire—FPC has denied petition to set aside approval of Idaho Power's revised plans for two of its Hells Canyon Dams. Idaho Power had originally proposed concrete-faced dams, but obtained FPC endorsement of rock-filled, pervious clay-cored structures . . . Alabama Power has filed application with FPC for 460,000-kw Coosa River hydro dam system to cost $121 million . . . Pacific P&L has asked FPC license to build 256,000-kw, $56-million Lewis River hydro project . . . AEC has reset price of thorium at $43 per kilogram.

Westinghouse Strike—Westinghouse employees at Columbus, where over 40% have returned to work, are reported collecting signatures on petition to NLRB for an election to certify new bargaining unit. In this they follow example of Mansfield IUE local 759 (office and clerical workers) which last month filed request for de-certification. Back-to-work movement gains meanwhile, with over 4,500 represented by IUE reported working in 9 plants. Westinghouse officials claim Mayors' Conference plea to get men back to work endorses their own pre-holiday proposal. IUE's Carey says Mayors' action endorses union stand on arbitration and time study of non-incentive workers.

Dams on Delaware—Hydro development of 200 Mw on Delaware River is proposed by Delaware River Development Corp's new application to FPC for preliminary permit. Three plants are proposed: 150,000 hp at Tocks Island, N. Y.; 72,000 hp at Belvidere, N. J.; and 60,000 hp at Chestnut Hill, Pa. Plan could also provide water for domestic consumption. Another plan, motivated by growing need for domestic water, will soon be submitted to the New Jersey Legislature by its Committee on Water Supply. This plan may tap the upper Delaware and includes small pumped-storage power installations.

Santee-Cooper—Committee investigating Santee-Cooper finances will ask South Carolina Legislature approval to continue its work until Feb. 15. Meanwhile, Santee-Cooper's general manager, Sen R. M. Jefferies, has suggested that "completely independent" panel of experts study Santee-Cooper finances.

Lignite Plant for Greece—Greek government has called for bids from U. S. companies to build new 70-Mw lignite-burning electric power plant at Ptolemais, Greece. Bids are due Feb. 29 and can be submitted in three-part package including: designing and building; supplying equipment; and financing.

ABOUT PEOPLE IN THE INDUSTRY

More than 20 million American homes, in which modern electrical appliances are being added constantly, have wiring facilities that are obsolete and under capacity, E. O. George, chairman of EEI Wiring Committee said last week in announcing nation-wide publicity campaign for adequate wiring in American homes. Centered around theme "Housepower," program will aim for upgrading home wiring to "take advantage of low-cost electricity for better living." (See p 10 for details.)

Russian science will be handicapped by lack of imaginative thinking, Dr J. B. Conant, American Ambassador to West Germany said. Questioned about reports of Russian strides in training engineer-scientists, he says "No one in the Soviet Union is educated." Soviet system can succeed in producing "run-of-the-mill technicians because they don't need to waste time educating their students"—they have to devote so much time to Marxist-Leninist indoctrination. This will be a handicap in the "long, 50-yr pull."

More News About People page 36

F. S. BLACK P. T. LAGRONE A. C. MONTEITH J. B. WALKER TOM FORT R. V. GAVERT R. W. BEIL J. A. MOCK
ELEC WORLD ALL OF WESTINGHOUSE ELECTRIC CORPORATION ELEC WORLD

Top Apparatus Officials Tell . . .

How Westinghouse Strike

- **Production continues at some plants despite picket-line violence. Subcontracting brings some relief.**
- **All engineering that can be done is being done.**
- **Majority of service shops are open and operating.**
- **For heavy equipment in production at strikebound plants, shipment schedules will be extended by length of strike plus one to three weeks.**
- **Orders for long-term delivery will be less affected because of plans devised for increasing production pace to make up for lost time.**
- **New delivery schedules to be available at field offices soon after strike ends.**

"During the night four parked cars in Sharon were paint-bombed, and windows of three cars leaving plant were broken. One man was hit by a stone going through car window but was not seriously injured . . . One man was slugged this morning as he entered plant . . . Mass picketing in Mansfield again this morning. Two cars overturned and a number of people attacked. . . . At Trenton this morning one supervisor was attacked by three assailants and kicked in the head as he left his home."

News and information bulletins such as these told part of the story.

Across three states, Ohio, Pennsylvania, and New Jersey, terror stalked the trail of workers who sought to enter and work at the struck plants of Westinghouse Electric Corp. Movies of the picket line violence told the grim tale to all who watched. One respected newspaper commented that violence at the Westinghouse gates was in reality "violence at the gates of freedom."

Westinghouse executives at headquarters, 3 Gateway Center, Pittsburgh, kept close watch on the strike bulletins issued every day at noon.

High up in the skyscraper headquarters the company's top labor relations strategists readied a counter offer in the latest round of negotiations. There was an air of quiet, forceful determination to settle the strike on terms which would preserve management's rights and the company's competitive position. Executives hope the strike has reached a point where a break can come at any time.

Down a few floors the top men of Westinghouse's apparatus division were busy keeping tabs on other parts of the strike bulletins. These were the production and shipment reports that painted the picture of slow flowing supply lines from the electrical industry's second largest manufacturer:

From the transformer plant at Sharon came news:

"Since Dec. 5, 52 carloads plus miscellaneous truckloads have been shipped. Value of shipments: $2,029,438. Built since Dec. 5: 501 distribution transformers.

There were similar reports from other plants.

The plant shutdowns spurred planning activity in the apparatus division as executives and top staffers devised methods to reduce the costly delays and meet emergency situations. Ingenious methods of shifting equipment

When Strike Is Over, Here Is What To Do

1. Give field offices and operating divisions at least two weeks to obtain information on specific item deliveries. Remember that time is required for shop cleaning, conditioning of machinery, and getting into operation.

2. Depend on field offices for up-to-date information on shipments. Such information will be made available at field offices as soon as it is prepared at headquarters.

3. If you must visit operating divisions to obtain shipping information or to expedite shipments, make appointments through field offices. Because of the wide concern over orders, shipping schedules, improvement in shipping schedules, it is probable that more customers and customers representatives will be visiting than can normally be accommodated.

Will Affect Customers

manufacture from shutdown plants met with some success—helping to relieve urgent schedules.

Everything that could be done was being done to forge ahead on the engineering and drafting for orders in hand. Schedules were constantly being revised and brought up to date so that manufacturing would be ready to roll once the settlement is signed.

Meanwhile sales offices are running at full capacity, offering service, making quotations, taking orders. Other service facilities are operating normally.

But the nation's electric utilities, plagued by delayed shipments, restless under ever-growing power demands, looked beyond the picket lines, beyond the bargaining table, beyond the headquarters staff. They wanted to know badly the production situation in the major equipment plants.

Here is an exclusive roundup, product by product, plant by plant:

Steam Division

Plants at South Philadelphia and Sunnyvale, Calif.

Production close to normal at Sunnyvale. South Philadelphia plant down.

Order schedules: In general, equipment in process of manufacture will be delayed by length of strike plus two weeks. New business for long term delivery will be less affected.

Certain phases of engineering and drafting work are proceeding. Orders have been scheduled for castings and other equipment to be used in future orders.

Machine work, where practical, is being subcontracted on forgings, etc.

Planning and hoping for maximum shop production after work resumes in order to minimize delays.

Generator Division

Plant at East Pittsburgh.

Plant down, shipments impeded by strike.

Order schedules: Generally delays will be equal to strike time plus one week. Plans underway to increase production in order to minimize delays. It was operating at less than capacity previous to strike. Orders received during strike are being processed and scheduled.

Engineering and drafting working. Where practical, subcontracts have been let for machining of shafts and similar work.

Transformer Division

Plant at Sharon, Pa.

Plant down except for engineering, drafting, and small production force.

Order schedules: Extended strike time plus two to three weeks. Definite shipping schedules will be sent to field two weeks after work resumes. New orders received during strike are being scheduled on basis of an increased production never before obtained. On some lines this will be equal to 30% higher than ever before.

Subcontracting not practical.

Switchgear

Plant at East Pittsburgh.

Plant down, shipments impeded by strike.

Order schedules: Delays will run length of strike plus one week, with every effort being made to reduce delays to minimum by increasing production.

Engineering and drafting going ahead.

Where practical, manufacture has been subcontracted.

Strike has not hampered processing and scheduling or orders.

Atomic Energy Division

Unaffected by strike. Work continues as scheduled.

Meter Division

Plants at Raleigh, N. C., and Newark, N. J.

Raleigh plant not affected. Newark delays to minimum by increasing production.

Manufacture of single-phase meters and sockets at Raleigh increasing every month. Production target for January is near plant capacity.

Order schedules for polyphase meters: Extended, in general, strike time plus seven days.

(*Continued on page* 10)

Ike Pushes John Day Project

. . . recommending partnership approach in State Of Union speech; Upper Colorado, Fryingpan-Arkansas also endorsed

The few words which President Eisenhower devoted to electric power in his State of the Union message were highly significant.

• He endorsed, for the first time, a partnership approach to construction of 1,105,000-kw John Day Dam in Oregon which already has been authorized as a federal project. Last year Congress voted $500,000 for Army Engineers' planning, ignoring the offer of three Pacific Northwest utilities to pay the $273-million cost of constructing power facilities on the $310-million project in return for 50-year contracts for the dam's power.

• The President endorsed, for the second time, two federal multi-purpose projects—the million-kw Upper Colorado River development and Fryingpan-Arkansas on the Arkansas River in Colorado. The President made no mention of Echo Park Dam, the most controversial part of Upper Colorado. But Secretary of Interior Douglas McKay has already stated publicly that he will not insist on retention of Echo Park if Congress will approve the rest of the project this year. Fryingpan-Arkansas is similar to Upper Colorado, but the smaller of the two projects.

• Eisenhower promised a "comprehensive legislative program for water conservation" later in the session. This will be built around the forthcoming report of his cabinet committee on water resources and power, composed of the secretaries of Interior, Agriculture, and Defense.

The President stressed the urgency of going forward immediately with water resource development. He warned that development cannot be accomplished overnight and declared, "The need is such that we must make faster progress and without delay." He "strongly" recommended action this year on the three projects he named specifically, as well as other projects "which provide for cooperative action between the federal government and non-federal interests."

EEI Shapes Wiring Program

Edison Electric Institute's new wiring promotion program (EW Dec. 25, p 56) has taken definite shape.

To be centered around its previously announced theme, "Housepower," the program will get rolling in May on these two vehicles:

1—A four-page advertisement in Better Homes & Gardens magazine.

2—Announcement of a $10,000 grand prize "Housepower" contest to run from May to September.

Program will be aimed primarily at the existing home market where an estimated 20-million dwellings are in need of rewiring. According to E. O. George, chairman of EEI's wiring promotion committee, the May ad will be the first of seven ads (the other six will be two-page spreads) to appear monthly through November in Better Homes & Gardens. The contest will offer a $10,000 cash grand prize plus 1,800 appliance merchandise prizes. It will be based on multiple choice questions dealing with house wiring, plus an entrant-written statement.

Other national promotion plans:

• Television commercials twice a week on each of two NBC daytime programs—Dave Garroway's "Today" and Arlene Francis' "Home." Series starts in October and continues, as presently conceived, for 13 weeks.

• Newspaper advertising either through national Sunday supplements or regular display ads.

George pointed out that the "Housepower" program would serve as a backdrop for local activities. As a starter he mentioned the contest in which utilities and other local industry groups can carry out tie-in promotions, distribute entry blanks, etc. He also pointed out that local spot announcements can be cut-in following the TV commercials.

Need for the "Housepower" program was emphasized by several industry leaders at a press meeting in New York, Jan. 10.

Atlantic City Electric Co's Pres B. L. England said residential use of electricity will double in next ten years and in some regions even triple. Everyone in the industry is in wiring trouble, he declared, but the utility loses most—among other things revenue, good will, and competitive position.

Carl Bremicker, National Adequate Wiring Bureau's new chairman, praised the program adding it "should have tremendous public impact."

Col H. S. Bennion, EEI's managing director, noted still another problem: Utilities' own engineering in serving greater loads. "We must examine the basic voltages at service entrance as well as voltages in the home," he said.

Westinghouse Strike

(*Continued from page* 9)

Engineers and draftsmen at Newark plant working.

Motor and Control Division

Plant at Buffalo, N. Y.—shut down.

Order schedules: Hope to be current on delayed orders in two to three months after work resumes except for large industrial control apparatus. Will probably take four to five months after end of strike to be current on large industrial control. All orders scheduled and schedules sent to field indicating shipment so many days after work resumes. Engineering department working in plant and full time. Where practical, work has been subcontracted.

Maintenance and Repair Shops

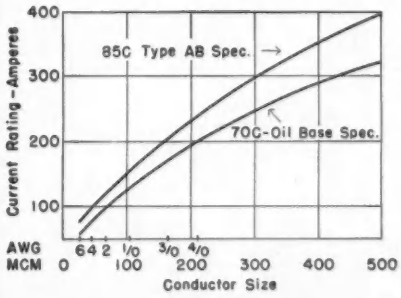
Major shops at Sunnyvale, Calif; Chicago; Philadelphia; Newark; Pittsburgh; Detroit; Cleveland; Atlanta.

Of 41 shops, 28 continue operation during strike. This includes majority of larger shops. Those unaffected are manufacturing items of apparatus which are urgently needed by customers. This has assisted in meeting emergency requirements.

Those involved in strike will resume manufacturing operations in a minimum of time after end of strike. In general, their schedules previous to strike, will be extended by strike time plus one week.

Greater current-carrying capacity of Type AB butyl high-voltage cable helps users cut costs, use new or existing facilities more efficiently.

Cable that takes the squeeze out of crowded conduits



85C OPERATING TEMPERATURE rating of Anaconda Type AB cable affords 22% more current-carrying capacity than 70C rated materials.

Now you can obtain the same amount of current with a smaller cable . . . or more current with the same size cable—with Anaconda's Type AB butyl high-voltage insulation.

For Anaconda Type AB butyl-insulated cable is recommended for operation at 85C *operating temperature*. Industry specifications recommend 70C for oil-base insulations. Thus, as the curves on the chart show, Type AB delivers 22% more current-carrying capacity . . . and more amps per dollar.

New Engineering Bulletin EB-27 gives you full details on performance of Type AB insulation in 15 Industry Specification Tests. Ask the Man from Anaconda for your copy. Or write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

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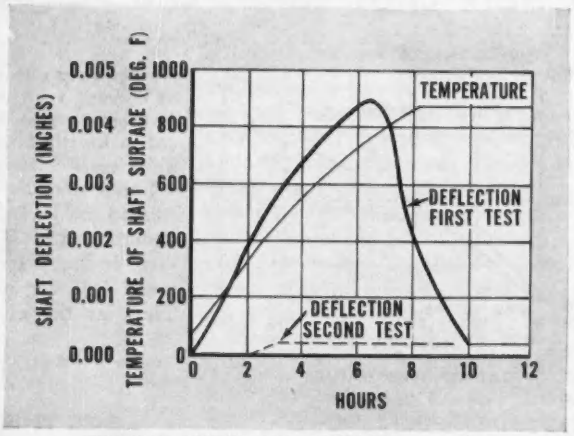
SEE THE MAN FROM ANACONDA®

—pioneer in BUTYL INSULATION

Taking the Bends out of



FURNACE WALLS ARE LOWERED around generator rotor for heat stability test. Chart shows shaft deflection before and after stabilizing treatment.

Turbine and Generator Rotors

General Electric's careful manufacturing procedures help assure thermal stability before units leave the factory

Large steam turbine-generators must be practically free of vibration in operation if long life and minimum maintenance are to be achieved. Continued smooth operation requires both good design and extreme care during manufacture and assembly of rotor components.

AN ESSENTIAL REQUIREMENT in manufacturing is to obtain maximum thermal stability of the rotors. A thermally unstable rotor will bend slightly when the turbine-generator is at operating temperature, introducing mechanical unbalance which may cause the unit to vibrate objectionably at running speed.

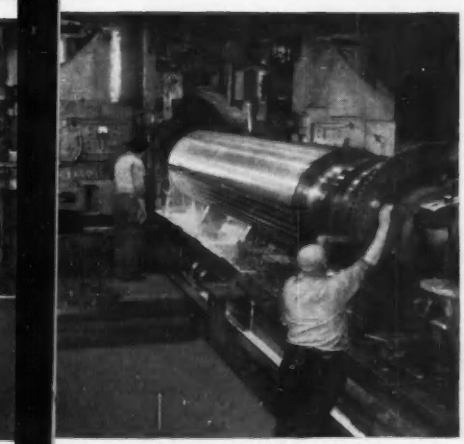
This type of instability may be caused by several factors. These include nonhomogeneity of the forging material and machining strains or distortion of the surface crystals during machining operations. And in generators, rotors may have slight variations in dimensions of slots and windings or dissymmetries in the ventilation circuit.

General Electric has developed standard manufacturing procedures to help make sure that rotors are thermally stable before leaving the factory.

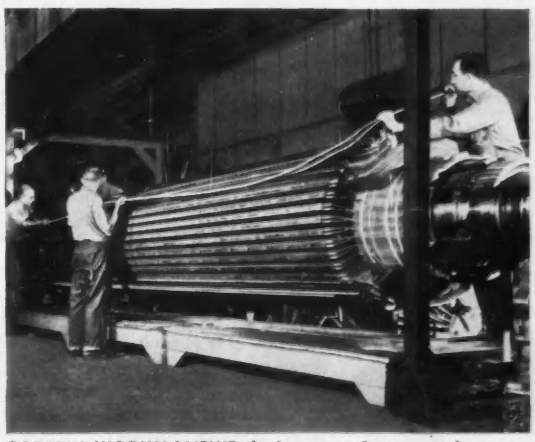
EARLY IN THE MANUFACTURING CYCLE turbine rotors which will be subjected to high operating temperatures, and large high-speed generator rotors are tested for thermal stability. If necessary, they are either "cured" in a heat lathe or rejected. In addition, careful manufacture, close inspections during various stages of rotor assembly, and factory tests at operating speed gives assurance of maximum thermal stability—a feature you can depend on with General Electric turbine-generators. If you would like more information on this subject, contact your nearest G-E Apparatus Sales Office or write for bulletin GER-767, "Balancing Turbine-Generator Rotors." General Electric Company, Schenectady 5, N. Y. 254-30

Progress Is Our Most Important Product

GENERAL ELECTRIC



ALTERNATE SLOT MILLING of generator rotor compensates for minor slot variations—provides symmetry.



CAREFUL WORKMANSHIP during manufacture and assembly of rotor windings helps equalize heat and temperature distribution, which contributes to thermal stability.

PRECISION BALANCE of generator rotors helps assure vibration-free operation.

Isolate load circuit faults with G&W Type "FC" Oil Fuse Cutouts

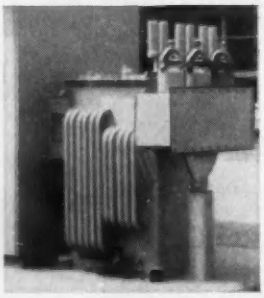
FC42

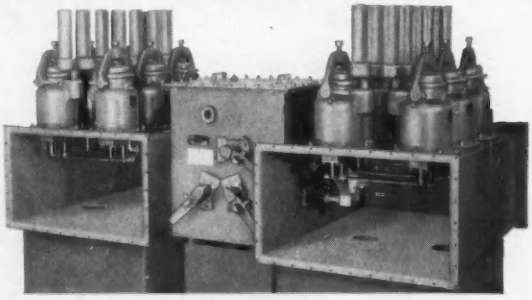
All steel enclosure, hermetically sealed—oil filled, protects men and equipment by safely withstanding high pressures of high voltage fuse clearing a heavy short circuit. In addition to the main purpose—a pressure tight enclosed fuse—the device serves as a full load break oil switch, three phase with gang-operated mechanism. Switching contacts are Beryllium copper. Fuse links are simple, inexpensive and easily replaced. Cable entrances are interchangeable—wiping sleeve, stuffing box or porcelain.

FC42

	Three sizes	Interrupting capacity per cutout
FC31	2500 volts, 100 amp.	6000 amps. at 2.5 Kv.
FC42	5000 volts, 200 amp.	16000 amps. at 2.5 Kv.—8000 amp. at 5 Kv.
FC61	8000 volts, 100 amp.	5000 amps. at 8 Kv.

SAVE INSTALLATION LABOR BY COMBINING "FC" CUTOUTS WITH OTHER EQUIPMENT





Send for Bulletin CB56 (New, January 1956). Call in our representative.

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G&W

C561

Utility, PUD Enter Partnership

. . . as Puget Sound P&L signs agreement with Chelan County PUD for joint hydro development and sells interest in another project to PUD; company's financial, power position enhanced

Puget Sound Power & Light Co of Seattle, Wash., has reached a long-term agreement with Chelan County PUD, Wenatchee, Wash., for partnership rights in the proposed construction of Rocky Beach Project on the Columbia River.

At the same time, the company sold its interest in the Rock Island Project, below Wenatchee on the Columbia, for $28,276,300 to the PUD. The Rocky Beach Project, larger of the two, is located upstream from the Rock Island development.

Partnership Has History

The partnership arrangement is not new to either participant. For the PUD joined with Puget Sound P&L five years ago in a $33-million construction program which increased capacity of the Rock Island plant from its original 85,000 kw to its present 249,000 kw.

Chelan PUD financed that program by selling most of the power to Aluminum Co of America for a nearby reduction plant. Subsequently, the Chelan and Douglas PUD's sought to condemn Puget Sound P&L's original holdings in the project, an action which the company brought to an end by its agreement to sell.

Power Supply Upped for Utility

The agreement provides that Puget Sound P&L will receive at least half of the power from Rock Island, as well as a minimum of 302,000 kw from 644,000-kw Rocky Beach. The Douglas County PUD, serving the area immediately to the east of both dams, will receive an allotment of up to 40,000 kw from Rocky Beach.

Frank McLaughlin, president of Puget Sound P&L, and L. J. Richardson, president of the Chelan PUD commission, jointly announced the transactions. The contracts "seek to speed up large-scale power resource development and to achieve the lowest cost power from existing and proposed projects through advantageous coordination and integration of operations and facilities," they said.

The Chelan PUD has a preliminary permit to study the Rocky Beach Project, estimated to cost a minimum of $200-million, and expects to file shortly for a construction permit. Puget Sound P&L will advance $1.5 million to complete engineering work now being carried on by the PUD.

Puget Sound P&L will be responsible for all costs of the Rocky Beach Project although the Chelan PUD will pay its share of the costs in proportion to whatever amount of power it uses locally, up to half of the total.

Both the company and the PUD are members of the Puget Sound Utilities Council.

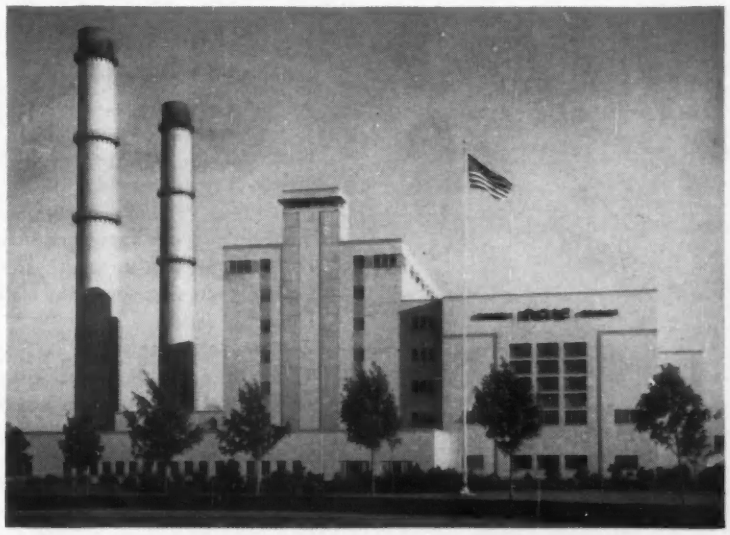
The new contracts substantially improve Puget Sound P&L's financial position by increasing its earned surplus by $11 million and book value of its common stock by approximately $3.50 a share. The company's capital structure now will be 40% debt and 60% equity as compared with 44% and 56% previously.

Treatment of the proceeds from the Rock Island transfer will postpone any new borrowings until next year. The company will pay capital gains taxes on the transaction, rather than treat it as a tax-free transfer, to have substantially lower income taxes.

Puget Sound P&L's license for the Rock Island Dam expires in 25 years while the contract with Chelan PUD is for 48 years assuring the company power supply for a longer period of time. The company has been drawing a minimum of 115,000 kw from Rock Island as compared to a minimum of 124,500 kw under the new contract.

"The only way both Puget and the Chelan PUD would have assurance of continuing to realize the maximum potential of Rock Island is for Chelan to own the entire project," said the McLaughlin-Richardson statement.

Rocky Beach is to have an initial installation of seven 90,000-kw generating units with an aggregate power capability of 644,000 kw. The addition of more units will raise ultimate capability to about 1-million kw.



Rochester G&E Wins Beauty Title

Rochester Gas & Electric Corp has won the title of "World's Most Beautiful Utility" for the landscaping of its Russell Station on Lake Ontario (above). The utility, one of the national winners of the Industrial Landscaping Contest, was presented with the award at the recent Eastern Regional Convention of American Association of Nurserymen.

The awards, given on both a national and regional basis, were instituted three years ago by the American Landscaping Association to encourage and stimulate interest in landscaping and beautification of industrial and other buildings.

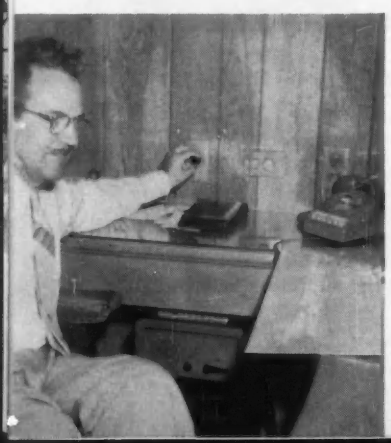
Located in Indianapolis, Ind., this prime example of living the all-electric way serves both as residence and business headquarters for its owner, O. C. Winters. Mr Winters, an architect and builder of custom homes, uses it as a showcase to sell the electric living idea to his clients.

Talk About the All-Electric Home! This one has . . .

Two 5-hp heat pumps (Insulation: 8 in. in ceiling, 12 in. around air ducts.

+ Electric kitchen including built-in oven, range surface units and rotisserie.
+ Cove lighting, valance lighting, spot lighting, all designed to give high-level, glare-free illumination, yet add glamor and decoration.
+ A calcinator.
+ 120-gal electric water heater.
+ Electric lamp in bathroom cabinet to dry towels and lingerie.
+ Two built-in television sets.
+ Wired television and intercom system for seeing and communicating with different points in house, and front and rear entrances.
+ Outdoor pool with waterfall. Electric pumps recirculate the water.
+ Garage doors which open and close by radio controls built into the family's two automobiles.
+ 600-amp service entrance.
+ Low-voltage, remote-control wiring provided by 13,000 feet of cable.
+ 2,000 ft of 54-pair cable on intercom and hi-fi systems.
+ 2,000 ft of other cables including heating cable embedded in floors and in sidewalks and driveway.

= All this adds up to a total connected load of 155.8 kw in one single dwelling. Usage: Lighting, cooking—18,000 kwhr, water heating—6,000 kwhr, air conditioning—3,200 kwhr, heating—36,168 kwhr. This is an estimated total of 60,168 kwhr per year. Peak demand of entire house load to date was 38.2 kw at 11:30 AM on Nov. 29, 1955. Load is served by 50-kva single-phase transformer.

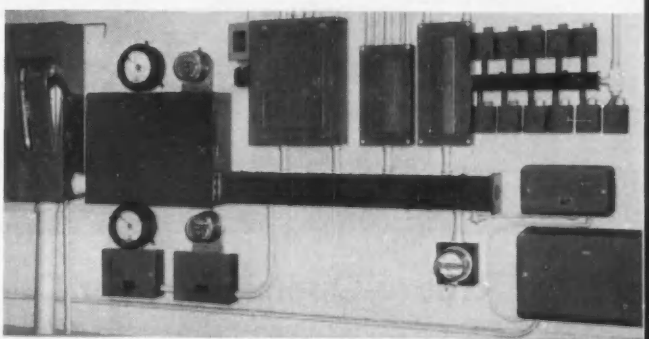


OWNER O. C. WINTERS keeps touch with other points in house via television and intercom system from desk

GOOD LIGHTING sheds proper illumination for seeing tasks, adds glamor. Home has 400 ft of slimline tubing

KITCHEN VIEW I: Range counter units, freezer, and refrigerator

KITCHEN VIEW II: Built-in oven, rotisserie, and electric sink units



NOT 200 OR EVEN 300 AMPS is enough. 600 amp entrance feeds electric service. Extra meters will provide data on heat pumps, other equipment

TWO 5-TON HEAT PUMPS, calcinator and refrigerator occupy utilityroom-garage. Heating cable in floors furnish supplemental heat on extra-cold days

Tempers Flare Over Niagara

. . . as Moses, Lehman clash on release of opinion questioning Congress' right to decide developer; Machold denies Governor Harriman's charge that private utilities have blocked project

Controversy over development of the U. S. share of Niagara River waters has flared again among those seeking developmental rights for the New York State Power Authority.

This time the hassle was touched off by a legal opinion which holds invalid a Senate reservation included in the 1950 treaty between the U. S. and Canada by which the two nations agreed on further development of the river. The reservation specifies that Congress has the right to decide who will develop the U. S. share of the waters.

In making the opinion public, Power Authority Chairman Robert Moses drew fire from Sen Herbert Lehman (D-N.Y.) who warned that challenging the treaty was "unwise" and "dangerous." A spokesman for Gov Averell Harriman stated that the New York governor supported Senator Lehman's views.

The opinion causing all the fuss was prepared by Philip C. Jessup, former legal adviser to the State Department, and Oliver J. Lissitzyn, an associate professor of public law at Columbia University. It held that the Senate reservation was invalid because it dealt only with a matter of domestic concern to the U. S.

Moses previously also had contended that the reservation amends the Federal Power Commission Act which gives the FPC power to decide who shall develop the Niagara (EW, Nov. 7, p 8).

Senator Lehman, who has sponsored one of two bills in Congress to give the Power Authority developmental rights, said that contesting the validity of the reservation would be "unwise" because it would "pit" the state against the Senate. It also would be "dangerous," he declared, because it would involve the Niagara issue in a dispute over treaty-making powers.

Moses, despite the outburst he had provoked, stood firm. However he said his agency would not take the reservation issue to court until it had been seen if Congress in its present session would decide on the Power Authority as developer for the Niagara.

Harriman-Machold Skirmish

As noise of the Moses-Lehman battle subsided, another skirmish over Niagara broke out between Governor Harriman and Earl J. Machold, president of Niagara Mohawk Power Corp.

In his annual message to the opening session of the state legislature, Harriman declared that the Niagara "project has long been blocked by five private utility companies which have been trying to get control over Niagara for themselves."

"It is shameful," he continued, "that while Canada has acted promptly to take advantage of its share of this great resource, we have been delayed by the opposition of those who would exploit the state's resources for their own selfish gains."

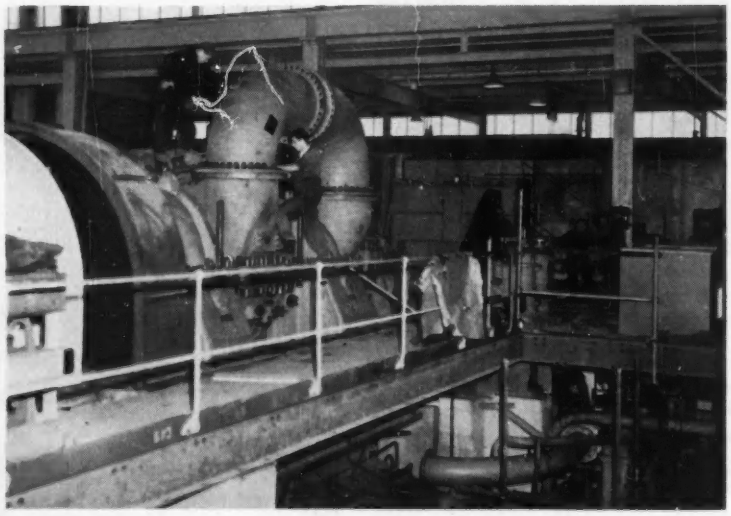
Machold, as president of one of the five utilities seeking developmental rights, promptly retorted in a statement, "The five investor-owned taxpaying . . . utility companies have in no way blocked the development of additional Niagara power. In fact, we have been waiting for over 30 years with plans in readiness to make this development as soon as additional water became available."

Cole Urges Popular Vote

To decide whether the federal government, the Power Authority, or the five private utilities should develop the Niagara, Rep W. Sterling Cole (R-N. Y.) recommended a popular vote.

In telegrams to Gov Harriman and seven other political leaders in the state, Cole said, "I strongly urge immediate concurrence by both political parties in determined efforts to submit the question to the voters of New York at the next general election through appropriate propositions."

Gov Harriman shrugged off the recommendation as "another Republican stall to delay development of the Niagara power by the state."



October Opening Set for Calder Hall

England's Calder Hall atomic power station in Cumberland will be opened by Queen Elizabeth on October 17. Photo above shows turbine generator installed at the plant.

In addition to feeding 92,000 kw into the national grid system, the Calder Hall station will produce plutonium as a by-product for use at nearby Windscale atomic plant.

Russia's nuclear power station, which it claims was the world's first, went into service last year, and develops 5,000 kw.

For further information on England's power development see p 51.

Designed and built to specifications you might have written...

SANGAMO POWER CAPACITORS

Power Capacitor Specifications

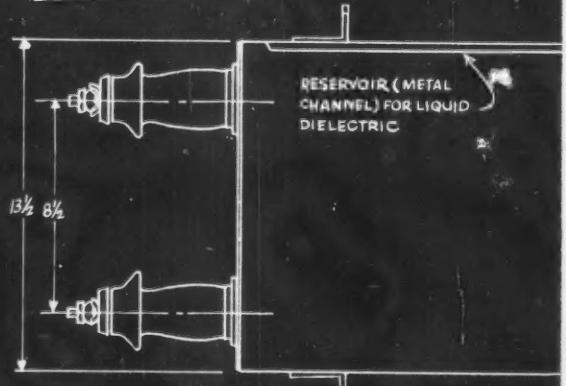
1. Corrosion protection – even though case finish is scratched.
2. Solder-sealed porcelain bushings.
3. Reliable performance at low ambient temperature.
4. Suitable for vertical or horizontal mounting.
5. Low losses.
6. Low temperature rise.
7. Stability under all operating conditions.
8. Terminal connectors for either copper or aluminum.

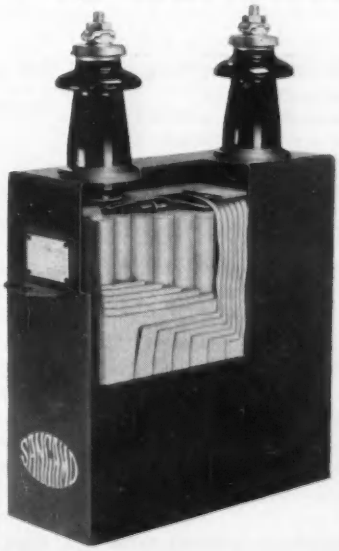
When Sangamo engineers were designing "the power engineer's capacitor", many utility men told them they wanted capacitors that could be mounted either vertically or horizontally.

Sangamo Power Capacitors can be mounted in either position. A metal channel provides a reservoir for the dielectric liquid, so when the unit is mounted with the nameplate up, full insulation to the case is retained—even in the coldest weather. If you want more details on the Sangamo Power Capacitor, write for Bulletin 1120.

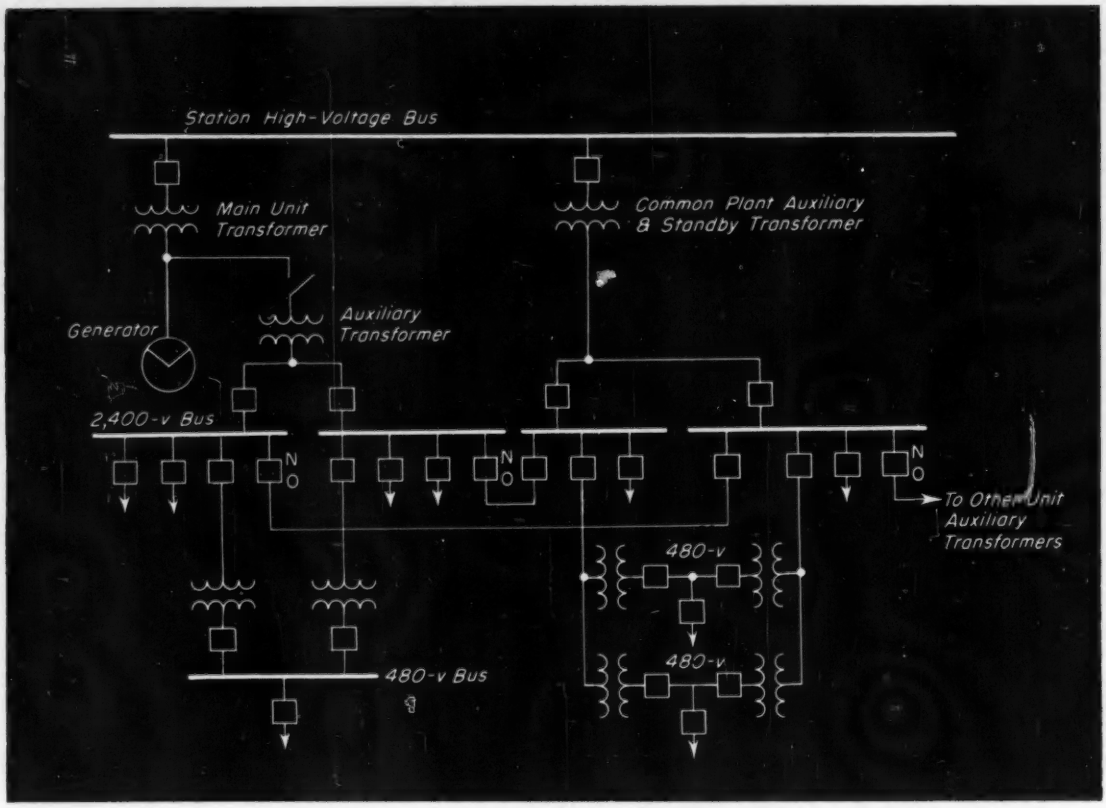
Sangamo offers a complete line of automatic capacitor controls operating on the basis of Amperes, Volts, Watts, Vars, and Time. Investigate Sangamo Lincolntrols and Time Switches for the best application of your power capacitors.

PC56-1





SANGAMO ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS



How Operating Concepts Affect . . .

Protection of Power Plant Motors

RELAYING AND PROTECTION
Design-Operation

For essential auxiliary motors balance must be maintained between unit service continuity and prevention of motor damage

C. J. BALDWIN, Electric Utility Engineer, Westinghouse Electric Corp, East Pittsburgh, Pa.

Protection of essential powerhouse motors requires a balance between maintenance of unit service continuity and the prevention of damage to the large motors involved. The relative emphasis placed on these two factors determines:

1. Relays applied.
2. Sensitivity desired.
3. Decision to trip or merely sound an alarm.

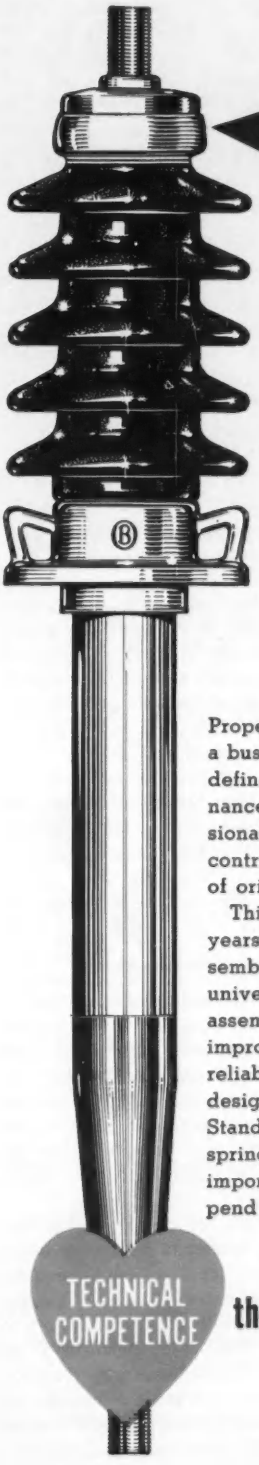
The powerhouse auxiliary motor today is caught in a changing concept of power plant performance. Most utility systems today, unlike the isolated, single-plant system of the past, have several multi-unit plants, plan spinning reserve, have alternate transmission routes, and heavy interconnections with neighboring utilities. Experience has showed that, with adequate emergency planning, units can be dropped unexpectedly without causing system shutdown or load loss. Certainly the output of any unit can be curtailed without serious consequence.

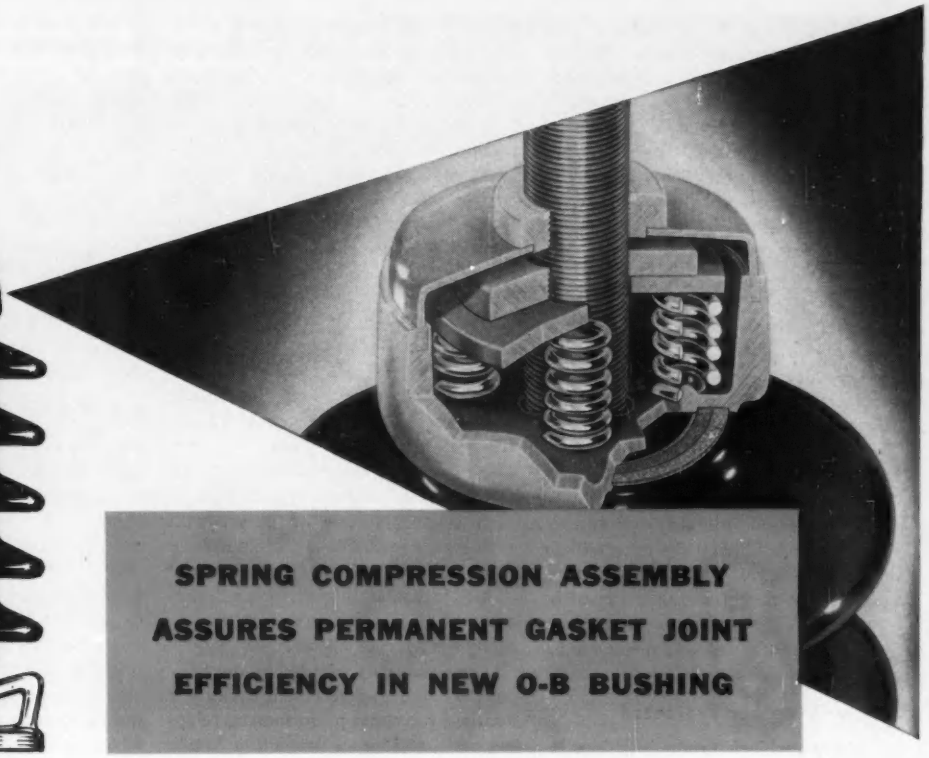
These facts have caused power plant designers to reorientate their thinking. No longer must equipment damage always be accepted as the price of service continuity. Generators are tripped today on excessive negative-sequence current to avoid a prolonged outage from major damage. Because of operating advantages auxiliary systems are grounded even though it permits unexpected curtailment of unit output when a single ground fault occurs.

Adoption of these practices, and others, is based on the reserve capability designed into present-day systems. This does not alter the need for designing high reliability into the powerhouse motor itself. However, to some degree it has affected the protective philosophy applied to powerhouse motors.

Powerhouse auxiliary motor drives fall into two classifications: essential and nonessential. Essential drives are

(*Continued on page* 22)





SPRING COMPRESSION ASSEMBLY ASSURES PERMANENT GASKET JOINT EFFICIENCY IN NEW O-B BUSHING

Another Extra, Beyond ASA Standards, that accounts for high reliability and high value

Proper performance of sealing gaskets in a bushing depends upon two factors: (A) A definite compressive force. (B) Maintenance of this force despite slight dimensional changes caused by expansion and contraction movements, and by any loss of original gasket volume.

This is not a new discovery. Over 30 years ago, O-B pioneered in a bushing assembly method that has since been almost universally adopted -- spring compression assembly. Long ago, this worked a vast improvement in bushing performance and reliability. With today's more critical new designs to produce the slim, efficient ASA Standard, O-B's long-proved compression spring assembly practice takes on added importance. Modern bushings, which depend upon the integrity of paper dielectric, must be protected with a total oil and moisture seal.

At time of assembly, a simple jig measures and sets the force exerted by the compression spring mechanism. Special parts retain this setting for the bushing's life. Over the slight amplitude of expected movement, this compression never varies. Gasket loading is measured, controlled, and un-changing, even after any volume loss.

Spring compression assembly and dependable sealing practices *are in no way covered by national standards.* This is just one of many extra touches of quality, and one of many extra reasons for performance, you will find in O-B's new bushings. Specify O-B on your station equipment and put all these extras to work for you.

TECHNICAL COMPETENCE

the heart of every *Ohio Brass* **bushing**

4537.H

boiler feed water, fuel, condensate, and condenser cooling water, without which unit shutdown would be imminent. Power failure on essential drives is permissible for intervals of a few seconds to a minute. The trend is toward shorter times with modern steam generators. Non-essential drives can be out of service for longer periods of time. But essential drives merit special attention in system layout and protection.

Fig 1 illustrates the most common present-day auxiliary supply system. Larger motors, above 100 to 250 hp, are served at either 2,400 or 4,160 v depending on unit size. Smaller motors are served at 480 v. Major essential drives are found at the higher voltage.

These large motors usually are switched by individually operated air circuit breakers. Occasionally a number of non-essential motors served at the higher voltage will be grouped on one breaker with individual fused high-voltage contactors.

Many Weather Protected

Many auxiliary motors in indoor locations are of drip-proof design, but with the increased number of outdoor stations weather-protected motors are becoming more popular. Totally-enclosed, fan-cooled motors find application in severely contaminated atmospheres. The type of motor enclosure is important in a consideration of motor protection because it is correlated with temperature guarantees and service factors, as shown in the table. All motors rated for 40C rise will carry 15% overload continuously with a safe temperature rise when operating in an ambient of 40C. Most motors on boiler feed and many other pumps are rated for 40C rise and have class A insulation. Motors installed where ambient temperature is abnormally high, such as forced and induced-draft fans, require class B insulation. Pulverizer motors are usually 40C rise, class A insulated.

Inrush Has Effect

Inrush current is another motor characteristic that affects protection. Most requirements can be met by motors having 60% starting torque, 200% pull-out, and 600% inrush. But pulverizers present the requirement of high starting torque combined with high-inertia load. These motors usually have 170 to 200% starting torque and 700% inrush or higher. Inrush currents on large auxiliary motors generally vary from 500 to 700%.

The philosophy adopted by the relay engineer will be determined by service continuity, system performance, relaying costs, and motor protection. While several relays may be required for complete protection, cost or continuity may dictate that only the bare minimum be provided. The essential or nonessential nature of the drive often determines what this minimum protection should be. Complete protection will guard against phase and ground short circuits, sustained overload, locked rotor, single phasing, and bearing failure. However, schemes short of complete protection are sometimes both justifiable and desirable. Avoidance of over-protection and consequent poor service continuity is a worthy consideration.

Powerhouse auxiliary systems, characterized by high short-circuit currents, invariably have short-circuit protection arranged to trip the appropriate breaker. Separate overcurrent relays of the instantaneous type are used in some cases, but motor protection against phase faults usually is provided by instantaneous trip attachments on the overload relays.

Settings Up to 250%

These relays must be set low enough to detect the minimum fault and yet be insensitive to inrush current on starting or transfer. Also they must not trip on the maximum asymetrical fault current the motor can supply to a fault elsewhere. The minimum setting to override inrush frequently is determined by trial starting. Settings on the order of 160 to 170% of rated inrush are the minimum expected, but required settings as high as 200 to 250% have been reported.

Setting instantaneous relays becomes more difficult as the minimum phase-to-phase fault current approaches maximum inrush current. One solution is percentage differential protection of the motor. Such protection is recommended generally for motors above 1,500 hp but may be necessary for smaller motors because of high inrush or low phase-to-phase fault currents. Above 500 hp there is no addition to motor cost when both ends of the winding are brought out for differential protection.

Trip Respective Breakers

Grounded auxiliary systems permit fast relaying of ground faults, usually by an inverse, very inverse, or high-speed induction-overcurrent relay connected in the neutral of phase current transformers. Like the phase short-circuit protection, these relays are arranged to trip their respective circuit breakers.

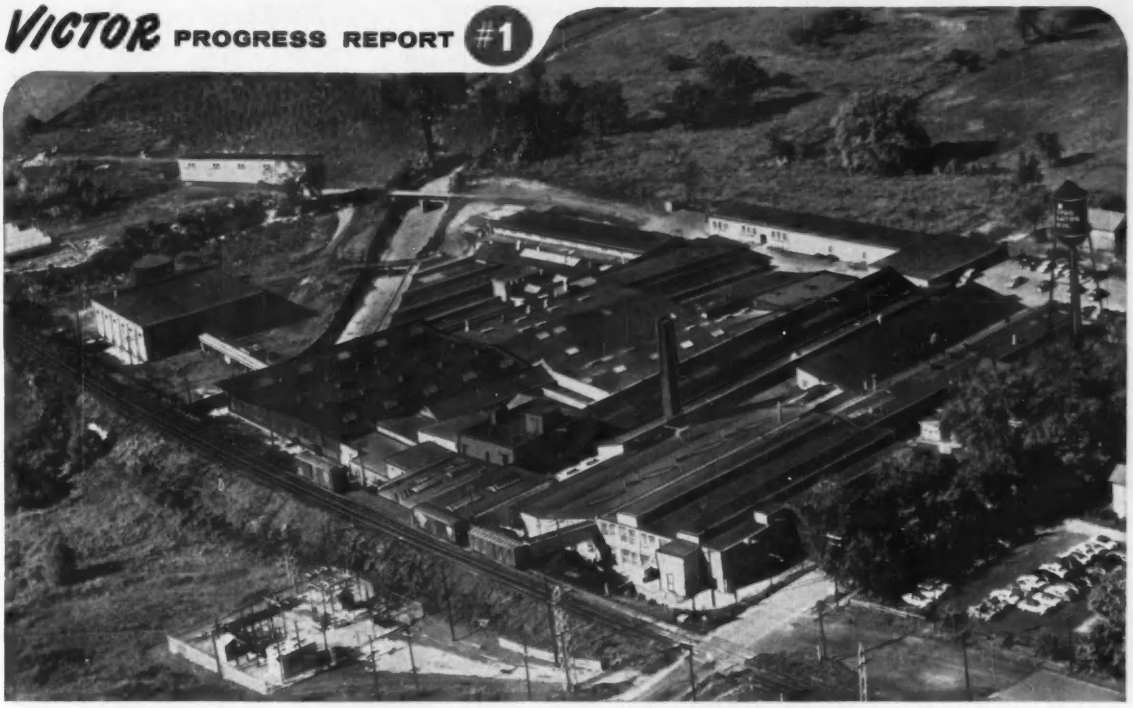
The setting of overcurrent ground relays might seem to be a compromise between the sensitive setting required by low system-ground-fault current and the insensitive setting necessary to override false residual currents on starting. This is not exactly the case. Ground-fault current is determined by the grounding resistor and is influenced

(*Continued on page* 25)

CHARACTERISTICS OF MOTORS MOST USED ON POWERHOUSE AUXILIARIES

Type of Enclosure	Temperature Rise Above Ambient, C	Ambient Temperature, C	Class of Insulation	Service Factor
Drip-proof	40	40 max	A	15%
		41 to 50	A	None
		51 to 60	B	15%
		61 to 70	B	None
Splash-proof	50	40 max	A	None
		41 to 60	B	None
Weather-protected	50	40 max	A	None
		41 to 60	B	None
Enclosed, self-ventilated with air cooler	40	40 (air from cooler)	A	15%
Totally enclosed, fan-cooled	55	40 max	A	None
		41 to 60	B	None
	75	40 max	B	None

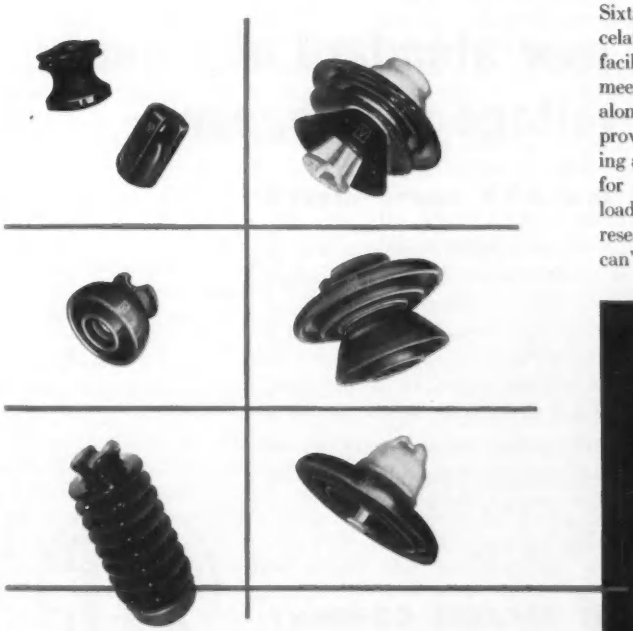
VICTOR PROGRESS REPORT #1



Portion of Victor plant outlined in red has been added since 1948.

VICTOR expands plant area 20%

TO MEET INCREASED INSULATOR DEMAND



"BETTER INSULATORS THROUGH RESEARCH"

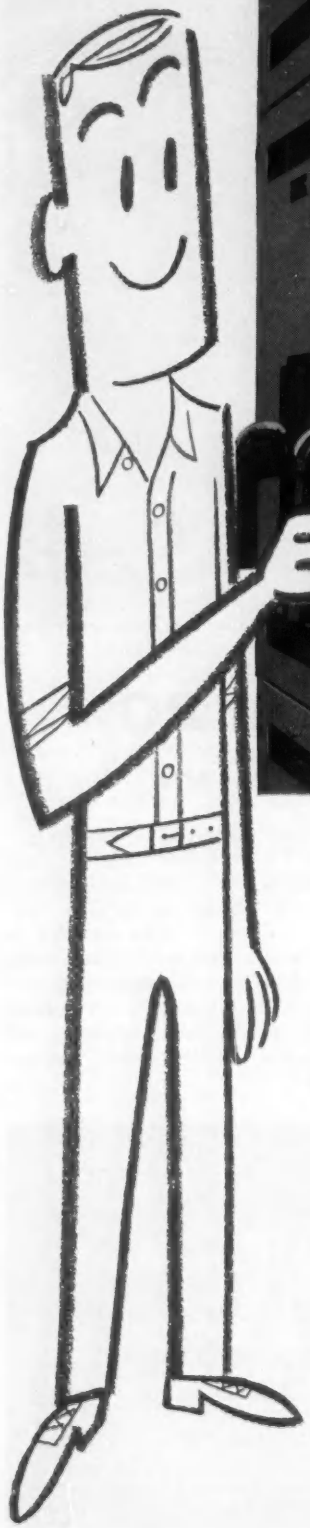
Sixty-three years ago the manufacture of wet process porcelain insulators began at VICTOR. Since then, the plant facilities at VICTOR have had to expand continually to meet increased demand. In fact, during the last seven years alone, VICTOR has had to enlarge its plant area 20% to provide greater facilities for switch and bus insulator, bushing and special porcelain manufacture, raw material storage, for new ceramic and electrical laboratories and in-plant loading docks. VICTOR'S modern plant, engineering and research facilities are unsurpassed in the industry! You just can't buy better insulators!

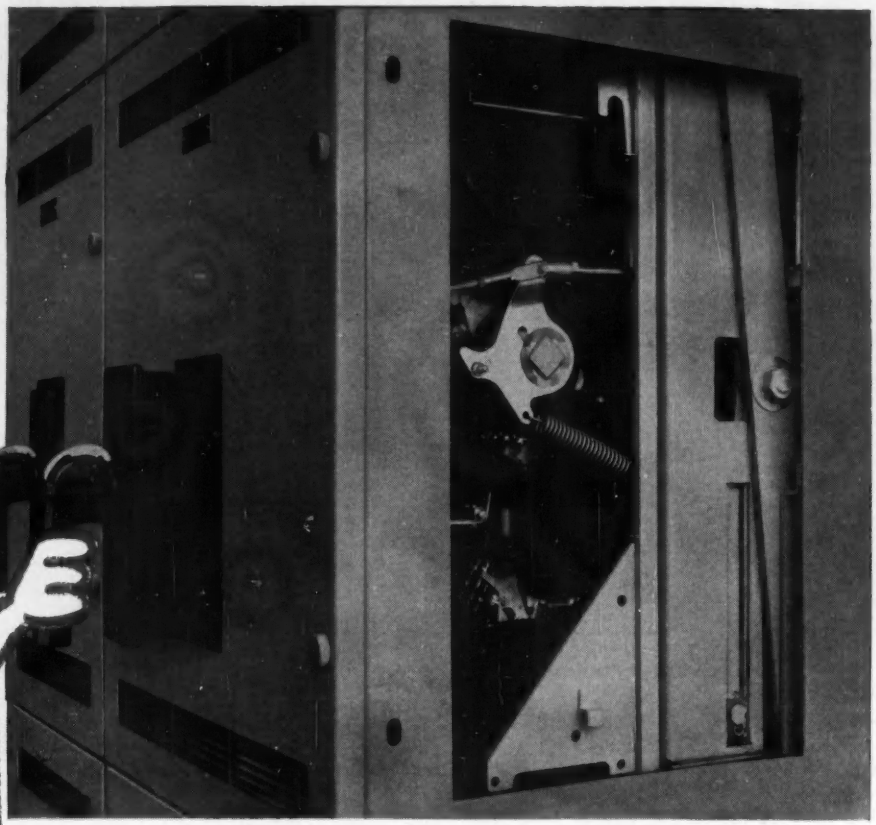
SPECIFY VICTOR

Purified Porcelain Insulators!

VICTOR INSULATORS DIVISION
I-T-E CIRCUIT BREAKER CO.
VICTOR, N. Y.

Low and High Voltage Pintypes • Suspensions • Guy Strains
Spools • Switch and Bus Insulators • Custom Designed Porcelain
Insulator Hardware





Now a new standard of safety in low-voltage switchgear

Test position with doors closed

This exclusive I-T-E low voltage switchgear feature establishes a new standard of safety in testing circuit breakers. It offers the additional advantages of reduced handling; less maintenance; convenient "tagging out"; better dust protection; easier circuit identification. And all are yours at no increase in cost in the compact, modern design of I-T-E low-voltage switchgear.

For complete information, contact your nearest I-T-E sales office. Or write for Bulletin 6004B. I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Philadelphia 30, Pa.

I-T-E CIRCUIT BREAKER COMPANY
Switchgear Division

Protect Power Plant Motors

(*Continued from page* 22)

by fault resistance. Current of three or four times the tap setting should flow in the relay during minimum ground fault to insure fast positive relaying.

Explains False Tripping

A very few cases have occurred where a sensitive ground relay has tripped on inrush to the motor during across-the-line starting. This false tripping is caused by saturation of phase current transformers during the starting inrush, causing residual current in the ground relay. Altering the neutral circuit impedance affects this current considerably, therefore one solution is to increase the ground relay impedance and sensitivity by decreasing its tap setting. The time lever should be set at a low enough position to limit fault damage while permitting sufficient delay to override residual inrush currents.

Temperature, current, or a combination of both are the quantities available to give sustained-overload and locked-rotor protection. This is the area in which protective philosophy and practice vary considerably from utility to utility. On one hand are those who emphasize continuity of service, provide a minimum of protection, and arrange it to sound an alarm only. Opposed are those who protect to prevent motor damage, basing their action on the assumption that loss of one unit or curtailment of its output would not endanger the system because of diversification and reserve capacity. Between these extremes are numerous schemes, some shaded toward one philosophy and some toward the other, applying different relays, using different settings, and varying the arrangement of trip and alarm circuits.

Embedded Detectors Used

Very large motors often are supplied with bridge-type relays actuated by temperature detectors embedded in the motor conductor slots. Embedded detectors can be installed in slots without creating artificial hot spots on motors rated above about 1,000 hp. They are installed on motors above 1,500 hp at no additional cost. Because a temperature detector relay might cause tripping on a short overload after it has passed, these relays usually only actuate alarms on essential drives, especially if the philosophy is inclined toward continuity of service.

Embedded detectors can supply information to a relay that combines temperature and current. Such a relay closes contacts when temperature of the stator windings has reached a predetermined value and current flowing in one phase exceeds a predetermined value. Both high temperature and overcurrent must be present hence tripping is prevented on starting if the starting duty is within motor capability. Tripping is also prevented on short thermal overloads.

This method is applicable only to larger motors because embedded detectors are required. Each temperature-current relay is factory calibrated for a particular application. It can be calibrated to permit full use of motor overload capability and is more likely to be used to trip than a bridge-type temperature detector relay.

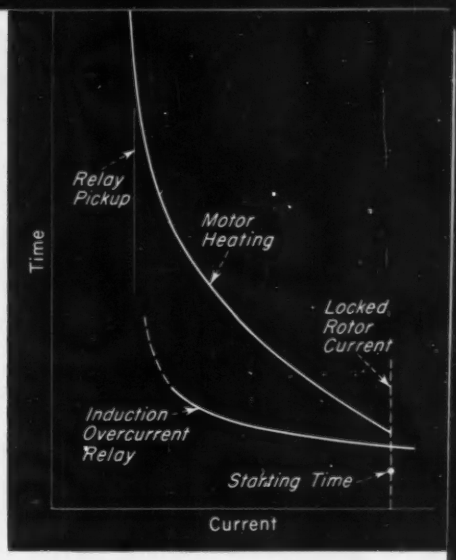
Application of thermal replica relays is hampered by lack of thermal design standardization for motors. Varied heating characteristics may make complete coordination from slight overload to locked rotor difficult for certain types of motors. This is especially true of high-speed and high-torque motors which have the shortest permissible locked-rotor times.

Replica Relays Available

Improved thermal replica relays with ambient temperature compensation now are available to provide shorter contact-closing time at high currents. While replica relays have been used for alarm functions only, the feasibility of tripping exists for drives where relaying philosophy is slanted toward motor protection. Proponents of tripping cite the excess capacity usually designed into essential powerhouse drives, the motor service factor of 15%, and the relay characteristic which permits about 118% load indefinitely or 125% for as long as one hour. Whether or not locked-rotor protection is afforded will be determined by the particular type of motor and the emergency temperature the user is willing to accept.

Type Commonly Applied

One of the relays most commonly applied to essential drives is the long-time induction-disk overcurrent type. It is often easy to set this relay for locked-rotor protection, but Fig 2 shows that it gives gross overprotection at lower currents. This characteristic leads to selection of conservatively high tap settings, particularly if the relay has been installed to trip.



Proponents of tripping point out that it is desirable to trip on locked rotor because the motor would be damaged before an attendant could correct the trouble or trip the machine after an alarm sounds. Also, with the possible exception of certain pulverizers, a locked rotor is probable only on start-up when loss of the unit may be unimportant. They further point to use of high tap settings, varying from 150 to 300% of rated load current, as permitting ample service continuity. When this relay is used alone, is set high, and is arranged to trip, its function is primarily locked-rotor protection. On the other hand, if it is arranged only to sound an alarm, it can be set to pick up at 115 to 125% of full load affording a conservative overload indication; locked-rotor protection then is nil.

Fig 2 shows a typical starting cycle plotted below the relay curve to emphasize the necessity of choosing a time lever setting high enough to permit starting. Time lever selection will be difficult if the spread between motor accelerating time and permissible locked-rotor time is small. Unfortunately no standards govern motor design in this respect. Most drives start in considerably less than 10 seconds at rated voltage. But unusually high-inertia drives, such as induced-draft fans, take 20 to 40 seconds to reach rated speed. Because starting current diminishes as the motor gains speed, the relay need not be set to allow locked-rotor current for the full starting time.

(*Continued on page* 27)

Prevent service interruptions... Install Wagner Distribution Transformers with the Wagner Winding-Temperature Overload Indicator

No more guesswork. No more costly, time-consuming load surveys. When you install Wagner distribution transformers equipped with the Wagner Winding-Temperature Overload Indicator you have a safe, accurate loading guide for distribution systems feeding rapidly growing residential and small industrial loads.

If an indicator-equipped transformer is overloaded, a brilliant red signal—which can be easily spotted—flashes on immediately. The operation of the transformer is in no way affected.

With this advance warning of overloads approaching the danger point, you have plenty of time to replace the overloaded transformer with a larger unit before a customer-annoying outage occurs.

***REMEMBER,* the Wagner Indicator is actuated by winding temperature**

This is important because transformer winding copper is subject to the highest temperature. There is no time delay as with indicators actuated by oil temperature. When the thermal element embedded in the transformer winding is heated to a predetermined temperature by an overload—on goes the signal lamp. Lamp stays lit until turned off by lineman who moves operating handle to "RESET" and then back to "NORMAL" position... handle is designed for hot-stick operation.

Write today for more information about Wagner indicators or, better yet, have a Wagner engineer explain how Wagner indicators can save you money by safeguarding your investment and preventing service interruptions... there's no obligation of course.

Wagner Winding-Temperature Overload Indicators can be furnished on Wagner oil-filled distribution transformers 3 to 100 kva single-phase and 9 to 150 kva three-phase, 15 kv and below.

WAGNER ELECTRIC CORPORATION
6456 Plymouth Ave. • St. Louis 14, Mo., U. S. A.

Wagner Electric Corporation EST. WE 1891

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS – AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

T55-17

Protect Power Plant Motors

(*Continued from page 25*)

The decision to alarm or trip with single overload relays hinges on the relative emphasis placed on plant service continuity and motor protection. A number of schemes use several relays in an attempt to do both. One such scheme supplements a very high-set induction-overcurrent tripping relay with a thermal replica relay to alarm on moderate overloads. Another uses very high-set tripping induction-overcurrent relays in two phases for locked-rotor protection with a low-pickup relay of the same type in the third phase to alarm for overload.

A third scheme supervises an induction-overcurrent relay set at 115 to 125% of full load with an instantaneous relay set at about 150%. For overloads below 150% the induction relay only alarms; for higher currents it trips through the instantaneous contacts. While the induction relay curve exhibits a poor match to motor heating characteristics, the importance of this has been minimized by providing a longer time for operator action.

Open Conductor Rare

Motor heating curves are altered appreciably by negative-sequence current and increased losses with an open conductor can cause fast burnout. Special relays for detecting current unbalance or negative-sequence current will afford protection. But open conductors are rare in powerhouse auxiliary practice because of widespread use of circuit breakers instead of fuses. Even where fused starters are used, special relays are seldom applied as regular overload relays are deemed sufficient in the interest of low cost and avoidance of overprotection. Cases of trouble from powerhouse motor single-phasing are rare.

Oil ring inspection holes and oil level gages are standard equipment on larger powerhouse motors. Oil level gages can be supplied for smaller motors, but standard equipment consists of an oil cup with threaded cover. If bearing temperature alarm is desired, bellows-type thermostatic relays or snap-action thermoswitches can be furnished at an extra cost independent of motor size. If continuous indication of bearing temperature is desired, dial-type thermometers are furnished. Temperature alarm and thermometers are used frequently on boiler feed pumps and fans rated above about 1,500 hp. But such equipment is usually applied only on the larger, more expensive motors.

Subnormal voltage on an auxiliary system is most likely to occur in emergency periods when continuity of service is important. For this reason under-voltage protection never is arranged to trip. While low voltage does cause motor overload, protection is afforded by overload relays. And undervoltage relays, if applied, should alarm only.

POWER BRIEFS

• Southern California Edison Co is acquiring about 100 acres near Mandalay Beach west of Oxnard for construction of a $75-million generating station. First unit, expected to cost about $35 million, will have a capacity of 200,000 kw, making it one of So Cal Edison's largest single generating facilities. Construction is expected to begin sometime this year, pending Public Utilities Commission approval of construction application for the project.

• Two 20,000-kw gas turbine electric generators, considered especially adaptable to the Canadian climate because of increase in efficiency as air gets colder and more contracted, are being ordered for the Edmonton, Alberta city-owned power plant at a total cost of $2,878,240. The turbines, reported to be among the largest of that type in the world, can produce 30,000 kw each at 40F below zero, and will provide reserve generating capacity for 1958 and 1959.

• Vero Beach (Fla.) City Council plans to spend $1.2 million for enlargement of its power plant to provide new street lighting and improvement of distribution lines.

• Long Island Lighting Co's board of directors has authorized installation of a 187,500-kw, $30-million addition to the generating station at Port Jefferson, Long Island. The new unit, when completed in 1959, will be the plant's third, and will duplicate the Edward F. Barrett Power Station now under construction at Island Park.

• Seminole Electric Cooperative is studying atomic energy technology in preparation of possible use of atomic energy for production of electric power. The study is being made under an "access permit" granted by Atomic Energy Commission.

• A drought in Quebec which has cut water power supplies has forced Aluminum Company of Canada to make a temporary 10% cutback in aluminum production this winter. Plants in Arvida, Isle Maligne, and Shawinigan Falls are affected. The Aluminum, Ltd, subsidiary had originally planned a 5% curtailment of production, but because of continuing low level in storage reservoirs which supply electric power for the company's Quebec smelters, the larger reduction was necessary. Production loss for 1956 will be about 65,000 tons.

Seeks Zoning Approval for GE Atomic Labs

Alameda County (Calif.,) Board of Supervisors has recommended that the 1,658-acre site for General Electric Co's proposed atomic research laboratories near Pleasanton be zoned for industrial use and has asked the planning commission to approve the zoning.

The $5-million development, first phase of GE's 15-year expansion program, will include a small prototype reactor, a radioactive materials laboratory, an experimental physics laboratory, and supporting services and facilities. It is scheduled for completion in 1957.

Second phase of the expansion program, scheduled for 1965 completion, will include electro-mechanical laboratory facilities, a chemical laboratory, and other testing facilities.

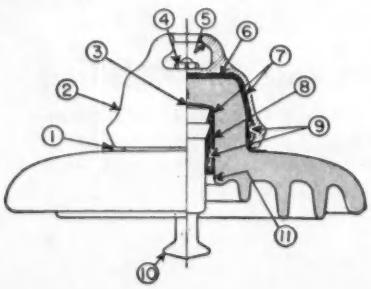
Total cost of the two phases will exceed $8 million.

Baltimore G&E Adds Unit

Baltimore Gas & Electric Co has ordered a 125,000-kw steam generator for installation at the Herbert A. Wagner station, Baltimore.

Triple-Tested...

Stainless steel pin, for use in high-contamination or coastal areas. Available in all suspension insulators on special order.



One of Illinois' outstanding porcelain products is this 10-inch suspension insulator. The cutaway view shows some of the features that assure quality.

1. Ample clearance between edge of cap and top of porcelain shield.

2. High-grade malleable cap, treated to prevent embrittlement when galvanized. Forged steel cap also available. Galvanizing is closely controlled in our own plant.

3. Treated fibrous washer provides a cushion between end of pin and porcelain.

4. Spring brass cotter key.

5. Smooth socket, accurately manufactured to standard dimensions.

6. Resilient compound provides cushion between bottom of cap and top of porcelain.

7. Resilient compound applied on inside of cap and outside of pin.

8. Sanded surfaces (controlled particle size).

9. Cemented joint between hardware and porcelain is neat portland cement.

10. Forged steel pin, accurately gauged to standard dimensions. Also available in stainless steel for use in high-contamination or coastal areas.

11. Radio glaze treatment available if desired, though these insulators meet satisfactory radio noise-level requirements without treatment.

Illinois Electric Porcelain... Triple-Tested To Insure Extra Mechanical And Electrical Strength

1 Complete laboratory control of materials.

2 Extensive new quality-control system.

3 Rigid final testing.

All combine to insure extremely high quality in the finished porcelain insulators.

by **W. V. SWAN,** Vice President
Illinois Electric Porcelain Company

In the two years that Illinois Electric Porcelain has been under Line Material Company operation, we have made extensive changes, from one end of the plant to the other.

A completely new ceramic laboratory has been built, containing the latest equipment for testing raw materials and production methods, and for developing new tests to assure customers that they will get insulators of extremely high quality.

Accurately Controlled Production

The latest precision production machinery has been installed. New, accurately controlled molding, pressing, drying, glazing, and firing equipment assure much more uniform production, and porcelain of greater uniformity in density and strength.

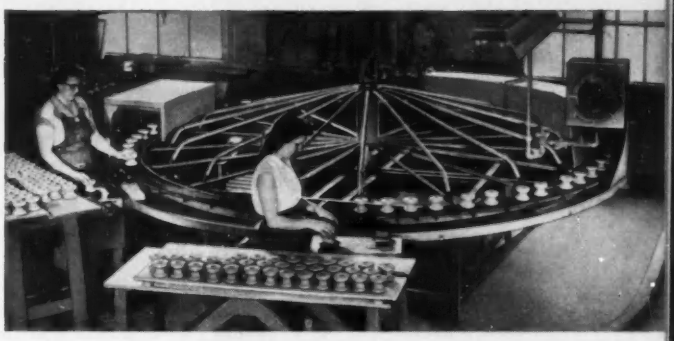
Our facilities include our own completely new, modern galvanizing plant for insulator hardware and fittings. This assures accurate quality control under our own supervision.

Amply Meet EEI-NEMA Standards

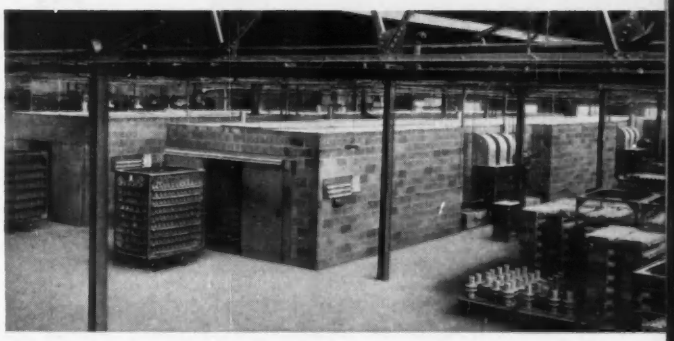
The result is that, today, porcelain insulators shipped from this plant are among the highest quality available in the industry. You can buy them with full assurance that you are getting porcelain insulators second to none. They meet EEI-NEMA standards with an ample margin of safety.

Get Complete Information

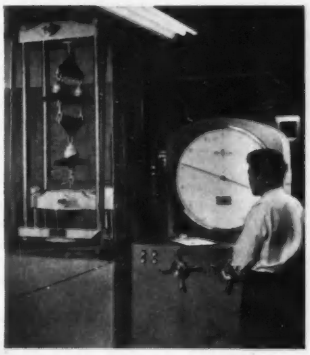
Illinois Electric Porcelain Company products include porcelain insulators, hardware, and fittings. These products are sold through Line Material Company. Ask the L-M Field Engineer for complete information, and a copy of the informative Bulletin DL8; or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).



Here's one of the newest developments at Illinois Electric. On this huge wheel, spool and pin type insulators and wireholders are automatically glazed on all sides and partly dried by warm-air circulation, insuring uniform, complete glazing.



Two huge automatic dryers gradually dry the formed porcelain. Heat and humidity are automatically controlled as the ware slowly passes through the dryers. This provides strong, dense ware, free from internal stresses.



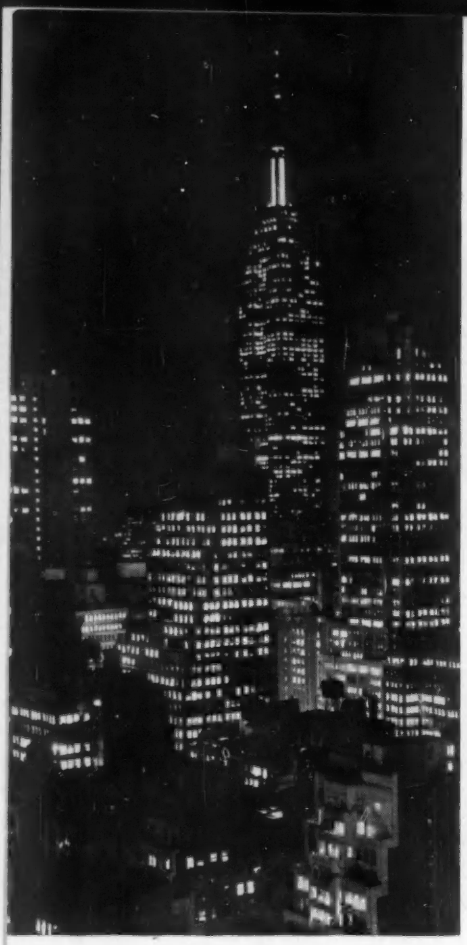
Suspension insulators are subjected to simultaneous mechanical and electrical test to destruction—a test performed on a representative quantity of insulators to insure high quality.

A corner of Illinois' complete new ceramic laboratory. The laboratory contains the latest equipment for analyzing materials and testing production processes.

ILLINOIS ELECTRIC PORCELAIN COMPANY
(a McGraw Electric Company Subsidiary) • Macomb, Illinois

Distributed by **LINE MATERIAL** *Electrical Porcelain Insulators*
(a McGraw Electric Company Division)

222



With more than ¾ths of its existing apartment dwellings inadequately wired, and new canyons of steel rising almost daily, Con Edison—serving the nation's most congested area—has problems probably unequaled by any other utility. Here's how it is . . .

Checking New York's Bad Wiring Epidemic

LOUIS A. SCHOFIELD, Vice President, Consolidated Edison Co of New York, Inc., New York, N. Y.

With two full years of experience with our adequate wiring program now behind us, it is gratifying to report, as the program goes into its third year, that definite progress has been made toward solving the inadequate wiring problem in Consolidated Edison Co's electric service area in and around New York City.

The results of all these efforts over the past two years are encouraging. Of course the inadequate wiring problem is still with us. The cumulative effect of installations—inadequate by today's standards—over many years cannot be overcome overnight. But the spread of the disease that had reached epidemic proportion definitely has been checked, and its scars gradually are being eliminated.

In the span of two years more than 14,000 one and two-family homes in Con Edison territory have been rewired. The gains in the new house field are even more impressive. In 1952, the year before we started our program, 70% of new services installed in New York City were 2-wire. In 1954, the first full year after our program got under way, installation of 3-wire entrance wiring was requested by builders or contractors in 83% of new homes. In 1955, 100% of new home services were 3-wire installations.

The number of homes going up in this area with three No. 2 conductors and 100-amp load centers is increasing steadily. More circuits are being installed in these homes than ever before, and the use of No. 12 wire instead of No. 14 for circuit wiring is becoming commonplace.

Apartments Improving, Too

The work of our Adequate Wiring Bureau with architects, consulting engineers, builders, and contractors in the apartment house field also has paid dividends in improved wiring standards. In 79 such new apartment houses, containing an aggregate of 5,786 dwelling units, the riser capacity was increased by more than 50% over that originally proposed. Further proof of the program's effectiveness is that many builders now develop their own wiring plans with much heavier wiring than they formerly employed.

Not too long ago only higher rental or luxury type apartment buildings in New York City featured 3-wire service to individual dwelling units. Now, however, 3-wire service to individual apartments is becoming commonplace, and wiring specifications of many apartment buildings going up today call for risers of at least No. 8 wire; some ranging up to 1/0 are being installed.

At every opportunity our Adequate Wiring Bureau has also worked with apartment owners, their engineers and contractors, on the improvement of wiring in existing buildings. In 269 existing apartment buildings riser capacity per dwelling unit has nearly tripled over the past two years. They represent a total of 10,725 dwelling units. In most cases the original capacity of the building was more than doubled.

Tenants in these buildings have

not been the only ones to gain. Wiring modernization has brought substantial new business to contractors and manufacturers. Nor has this rewiring been a burden to the landlord. He has been able to recoup his investment through rental increases.

Jobs Average $200

Average rewiring costs run over $200 per individual apartment. As more than 167,000 apartment buildings in our service area are more than 20 years old and our surveys showed that 78% of these were inadequately wired, there is a need for a tremendous amount of rewiring work.

We know also of 70 specific commercial buildings in which some 7.5 million sq ft of rentable area has been rewired, resulting in an overall increase in riser capacity of 17,457 kva. Through the first 11 months of 1955 our Adequate Wiring Bureau reported the completion of 189 wiring jobs in new and old residential and commercial buildings for which it had submitted recommendations. The combined increase in capacity in apartment and commercial buildings totaled 24,753 kva in this period.

In short, older buildings are being rewired and new ones are putting in bigger and better wiring installations. Con Edison has contributed to this in another manner by making 265/460-v service available for large structures with heavy electrical demands (EW, March 21, 1955, p 127). This distribution voltage provides builders with economy in wiring for a given capacity. Our experience has been that builders take advantage of this system to provide greater wiring capacity rather than as a device to cut costs. There are six large commercial buildings now in construction which will use 265/460-v service, and 11 more are planned. These 17 buildings will have a total electric demand of 145,000 kw. The continuing boom in air conditioning, lighting levels of 60 ft-c today with 100 ft-c just around the corner, electronic business machines, and a host of other factors, all dictate the larger wiring installations being made.

First National City Bank of New York photo

BANKS, OTHER LENDING GROUPS COOPERATE by staging lobby displays, promoting wiring and property loans, and by distributing AW literature

Has Industry Help

Fortunately, we have not had to work alone in our effort to raise interior wiring standards in New York homes, apartment and commercial buildings. Although we at Con Edison take pride in having spearheaded this activity, we have enjoyed the enthusiastic support of all segments of the local electrical industry.

Boom Brought Crisis

Looking back, it would appear that the inadequate wiring problem reached its peak here in 1952-53. This problem had been sneaking up on us over the years, as indeed it had elsewhere in the nation. The postwar appliance boom—the mass appearance of such items as television, air conditioning, and broilers coupled with an increase in the use of all types of appliances—naturally precipitated the crisis. By 1953 when we took a long, hard look around us, we found overwhelming evidence of inadequate wiring in all types of buildings.

To implement our attack on the problem, we launched our adequate wiring program in December 1953. The initial fanfare was somewhat muted by a citywide daily newspaper strike at that time. Since then, however, we have promoted adequate wiring at every opportunity, at all levels. Our Adequate Wiring Bureau, established at the same time, has worked closely with the electrical industry, with real estate management people, and with local lending institutions toward the accomplishment of this end. The local press has shown a keen interest in the subject on repeated occasions and this has been a big help.

One immediate goal of the program was to convince builders, architects, and contractors of the importance of raising electric wiring standards in new construction and to encourage banks and savings and loan associations to promote wiring modernization financing.

Another important and continuing

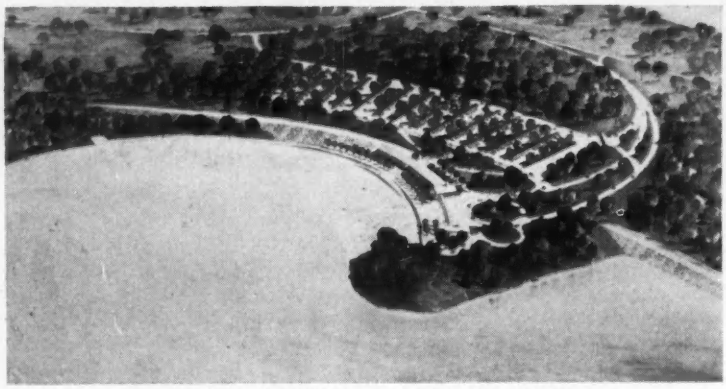
(*Continued on page* 54)

Fewer "No Light" Calls, Too

A decline in "no light" calls from customers is another indication that Con Ed's adequate wiring message—which also emphasized the simplicity of replacing blown-out circuit fuses—has reached its mark. Back in 1952 the utility's service personnel responded to 262,000 "no light" calls, most of which were found to be related to inadequate wiring. In the first ten months of 1955 they had dropped to 26,000—about 10% of the 1952 total.

Since 1954 Con Edison has not responded to ordinary "no light" calls but instead refers customers to their neighborhood electrician or to a servicing agency equipped to render 24-hr service. However, it continues to handle hardship cases or those where Con Edison equipment is responsible for the "no light" condition. It feels the public's understanding of inadequate wiring's symptoms, one of which is fuse blowing, has been largely responsible for the decline.

OBSERVATION ROOM AND PROMENADE ON TOP OF CONTROL BUILDING



BARNHART ISLAND BEACH IS PART OF ST. LAWRENCE STATE PARK

St. Lawrence Project Gets Face-lifting

Construction of the St. Lawrence Seaway, from which 940,000 kw will be realized for the U. S., is going ahead on schedule with elaborate plans laid to accommodate visitors at this New York State Power Authority project.

The Barnhart Island Powerhouse will include an observation room with promenade (see photo), exhibition rooms, and an auditorium. The St. Lawrence State Park will provide facilities for swimming, boating, picnicking, and camping. The park's beach on Barnhart Island is shown above. Another beach, not a part of the park, will be located near Massena and will be leased to the town at a nominal fee to cover costs of maintenance and operation.

Tacoma Okays Survey of its Utilities

The Tacoma, Wash., City Council has approved a $25,000 survey of the city's utilities, including City Light, to comply with a charter provision.

The New York firm of McKinsey & Co, management consultants, will survey City Light's operating financial policies, operating organization structure, and future organization and personnel requirements.

The survey will be the first to be undertaken since a new city charter went into effect several years ago. Its purpose, as specified in the charter, is to assure "the owners of these utilities (the taxpayers) that they are being run in a business-like manner and that adequate steps are being taken to plan for future operations."

The survey is expected to require four or five months. Written reports on City Light functions will include a step-by-step program for installing "developed recommendations, which would provide a working guide to monitor progress made" by the utility.

N. Y. Town Will Decide Service by Utility or City

Citizens of Ogdensburg (pop. 16,166), N. Y., will decide in March whether or not the city will purchase Niagara Mohawk Power Corp's local facilities and establish a municipal distributing system.

If the city does go into the power business, it apparently will be looking around for new workers to man the organization. For 29 members of Local Union 836 of the International Brotherhood of Electrical Workers have stated that they would prefer to continue working for Niagara Mohawk instead of the city.

But the city council has voted 6-0 in favor of the municipal system and approved a law providing that the city may construct or purchase power facilities at a cost of $990,000 to $1,250,000. A referendum on the power proposal is scheduled to be held on March 21.

Ogdensburg is located near the St. Lawrence Power Project now under construction by the Power Authority of the State of New York.

Construction Bids Called for Puget P&L Offices

Bids for construction of a $1-million new headquarters building at Bellevue, Wash., have been called by the Puget Sound Power & Light Co. The bids are scheduled for opening Jan. 19.

The project calls for a reinforced concrete structure with full basement and three floors. The main section will be 64x242 ft while a one-story and basement wing, housing a demonstration room, will be 42x60 ft. Two passenger elevators are provided. Interior features include suspended ceilings while the exterior will have insulated porcelain enamel panels. The site will have surfaced parking spaces for 200 cars.

Puget P&L, whose central offices have remained in Seattle despite the sale of the company's properties in that city to Seattle City Light several years ago, will vacate its Electric Building headquarters in Seattle when the new structure is completed. Bellevue is across Lake Washington from Seattle, in a rapidly-growing residential and commercial area served by Puget Sound P & L.

ROEBLING PAPER POWER CABLE WITH TELLURIUM LEAD ALLOY SHEATH

YOU WANT

- *MAXIMUM FATIGUE RESISTANCE;*
- *SUPERIOR STABILITY UNDER HEAT;*
- *HIGH BURSTING STRENGTH;*
- *ABOLITION OF THE NEED FOR FREQUENT STOP JOINTS, REINFORCED LEAD SHEATH, GENEROUS EXPANSION BENDS, LARGE MANHOLES;*
- *LOWEST LONG-TIME CREEP RATE;*
- *THE RELIABILITY ASSURED BY OUR EXCLUSIVE MANUFACTURING, TESTING AND FIELD EXPERIENCE...*

IN SHORT,

YOU WANT

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 11-15 STILLING ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1930 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • PITTSBURGH, 1723 HENRY W. OLIVER BLDG. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6, N. Y.

Helping the industry meet its growing loads

Better Service Continuity From 50 Years of Condenser Bushing Research and Development

Long ago, Westinghouse realized that bushings on your transformers and breakers must be one of the strongest links in your system.

Over 50 years ago they designed the first bushings using the *condenser* principle to provide a smooth voltage gradient throughout the insulation. Continuous improvements since then plus developments such as vacuum oil impregnation and high-strength, one-piece porcelain have resulted in today's trouble-free Type "O" bushing which only Westinghouse can offer you.

The dependability of these *Type "O" condenser* bushings which assures service continuity to your customers has been proved by 38,650 bushings in the field which have given service exceeding 180,000 bushing years since 1942.

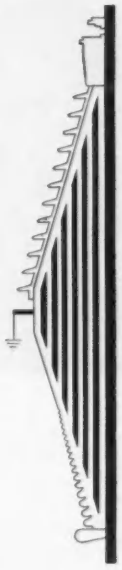
Another feature to provide both economy and ease of maintenance is the interchangeability of the Westinghouse bushings between transformers and breakers.

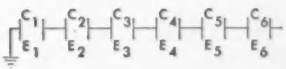
The same engineering leadership that developed this idea 50 years ago continues at Westinghouse today, searching out answers to your system problems . . . answers that, like the condenser bushing, will prove of greater and greater value to you as systems grow. J-97192

YOU CAN BE SURE...IF IT'S

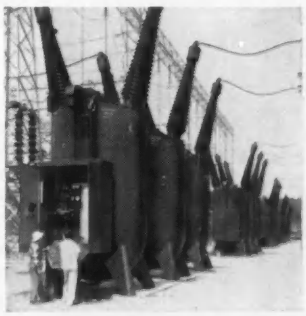
Westinghouse

Type "O" Bushings . . . Trouble-Free Insulation





A series of equal capacity *condensers*, spaced concentrically around the conducting lead, provides uniform voltage stress not only throughout the insulation but also over the external surface. Oil impregnation under vacuum eliminates the possibility of voids in the insulation. This, together with the smooth *condenser* gradient, banishes internal corona with its resulting radio interference and insulation breakdown. The one-piece, high-strength porcelain is Westinghouse manufactured and engineered to coordinate with the bushing design.



At Ohio Valley Electric Company's Kyger Creek switchyard, these 330-kv, 25,000,000-kva circuit breakers are equipped with 330-kv Type "O" bushings as shown on the opposite page. For further details on Type "O" or Type "S" condenser bushings, call your Westinghouse sales engineer, or write Westinghouse Electric Corporation, P.O. Box 868, 3 Gateway Center, Pittsburgh 30, Pa.

E. H. WILL

H. A. HITCH

M. CARY

W. I. DOLBEARE

Vepco Promotes Executives

Virginia Electric & Power Co has elected Erwin H. Will president to succeed Jack G. Holtzclaw who died early in December. H. Atwood Hitch, secretary, was elected a vice president, and Vice Presidents Miles Cary and Walter I. Dolbeare have been assigned additional duties.

The utility also set up an executive committee, naming T. Justin Moore as chairman, with Montelle C. Smith and Will as members. New system operations manager is A. H. McDowell, Jr, and Ralph Kilday succeeds Hitch as secretary.

Will, vice president and general manager since 1954, joined Vepco in 1922 and later became Suffolk manager. He joined El Paso Electric Co in 1935 and rose to president. In 1947 he returned to Vepco as general manager of operations and was named vice president of operations in 1950.

In his new post Hitch will direct activities of corporate, personnel, and public relations departments.

Cary, vice president of operations, will assume additional duties in connection with engineering and construction activities of the system.

Dolbeare continues as vice president of area development and will also direct the system sales department.

Smith is retiring as an officer but continues as a member of the board of directors and executive committee.

New Officers Named in Square D Merger

F. W. MAGIN

A. G. PATTERSON

F. W. Magin and A. G. Patterson have been elected chairman of the board and president, respectively, of the recently merged Square D Co and Electric Controller & Manufacturing Co.

Concurrent with the merger, in which Square D, as the surviving company, operates EC&M as a separate division, Dr John D. Leitch has been appointed vice president of engineering, and Alvin C. Dyer becomes vice president and general manager of EC&M.

Magin has been president of Square D since 1933. He had been associated with Industrial Controller Co from 1913 until 1929 when that company merged with Square D. He was then made vice president and general manager of the Industrial Controller Division.

Patterson, Electric Controller president since 1952, joined the company in 1944 as treasurer. He became secretary and a director two years later. Before that he was secretary-treasurer and a director for Tubular Alloy Steel Corp, a U. S. Steel Corp subsidiary.

In his new position, Leitch will coordinate engineering activity for Square D plants in nine U. S. cities and in Toronto and Mexico City. He was formerly vice president and chief engineer of EC&M.

Dyer, vice president of sales for Electric Controller since 1943, joined the company in 1913 as a salesman and successively became a district manager and general sales manager.

J. D. LEITCH

A. C. DYER

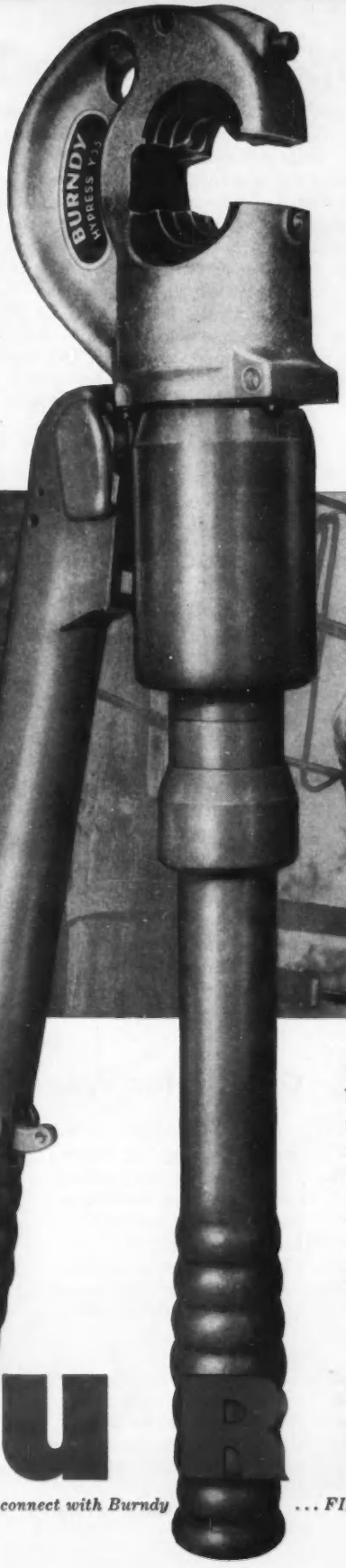
taps and splices

copper
ACSR
aluminum
steel and
copperwelk

NOW...

BURNDY PUTS 12 TONS IN YOUR HANDS

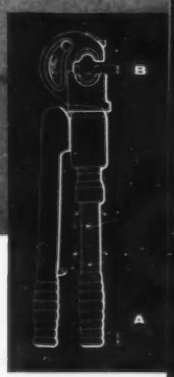
Y35 HYPRESS



all **BURNDY** compression connectors for overhead lines may be installed with the **Y35 HYPRESS** including

- CRIMPITS
- HYSPLICES
- DEADENDS
- ELTAPS
- LINKITS
- BYTAPS
- T-TAPS

SIMPLIFIED DIE INSERTION — Identical interchangeable head and ram dies easily inserted and locked in position so that HYPRESS can be moved along connector without movement of dies.



QUICK RAM ADVANCE — Clockwise rotation of handle (A) moves die up to grip connector (B). Installation is completed by pumping until built-in overload valve clicks open. Trigger returns die to pre-set position.

Burndy developed and produced the first portable hydraulic HYPRESS in 1938. Experience and field usage since that time has made these features possible:

- Lightweight — weighs only 12 pounds
- Head Rotatable 180°
- Neoprene Insulated Body and Handles
- Crimping Die Release Trigger on Handle
- Sealed Hydraulic System

For further details or demonstration, contact your Burndy representative or write Burndy, Norwalk, Connect. — Toronto, Ontario for instruction manual.

BURNDY

55-6

It's good business to connect with Burndy ... FIRST name in electrical connectors; tools; methods

Philadelphia Electric Ups Rincliffe to Top Post

R. G. RINCLIFFE

Philadelphia Electric Co has announced the election of R. G. Rincliffe as chairman of the board and chief executive officer. As board chairman he succeeds Horace P. Liversidge who died early in December. Rincliffe, president since 1952, will continue in that post.

Rincliffe joined the utility in 1923 as an engineering assistant, and progressed through various positions, including superintendent of gas manufacturing, purchasing agent, manager of electric generating stations, and vice president in charge of electric operations. He was elected executive vice president and a director in 1950.

A graduate of Yale University, he holds an MS degree in chemical engineering from Massachusetts Institute of Technology.

Rincliffe is executive vice president and a member of the board of trustees of Power Reactor Development Co and serves as a member of the board of governors of Electrical Association of Philadelphia.

Aymond Made Vice President

A. H. AYMOND, JR

Consumers Power Co board of directors has elected Alphonse H. Aymond, Jr, as vice president and general counsel.

Aymond has been a member of the company's legal staff since 1947 and has served as general counsel since September 1955.

Prior to joining Consumers Power, he was a member of the legal staff of Commonwealth & Southern Corp.

He is a graduate of Northwestern University and the law school of University of Michigan and is a member of the State Bar of Michigan and the American Bar Association.

Brockton Edison Names VP

P. E. MILSTEAD

Paul E. Milstead, general engineer for Tampa Electric Co since 1949, has been elected vice president of Brockton Edison Co to succeed Louis F. Eaton, operating vice president who recently was appointed president of the utility (EW, Dec. 12, 1955, p 180).

He will have charge of the company's operating departments not including accounting and sales.

From 1942 to 1949 he served Stone & Webster Service Corp, assisting in supervision of all foreign companies and several domestic utilities associated with the firm. He is former general manager, Hoosier Public Utility Co.

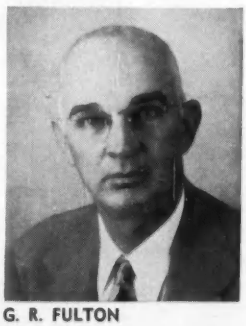
PERSONAL BRIEFS

Joseph D. Lawrence has been designated Roanoke Division manager of Appalachian Electric Power Co. Lawrence, previously assistant division manager, replaces **W. I. Whitefield** who retires after 40 years with the utility.

Paul C. Meyer, former vice president of administration of Kaiser Metal Products, Inc, has been elected vice president of the Henry J. Kaiser Co, with responsibility for all administrative activities of Kaiser Engineers Division and its subsidiaries.

Federal Telephone & Radio Co, division of International Telephone & Telegraph Corp, has named **Joseph A. Frabutt,** former general sales manager, as vice president with responsibility for operations and production at the factory being built in Los Angeles for FTR's Pacific Division.

Gulf States Promotes Fulton



G. R. FULTON

Gulf States Utilities Co has appointed George R. Fulton vice president in charge of the company's Texas operations. He has served as vice president in charge of Lake Charles (La.) Division operations for the past 13 years.

Fulton has been associated with Gulf States since 1931, when he joined the utility as superintendent of production.

He began his utility experience with Savannah Electric Co in 1916 and later was employed in various capacities by Baton Rouge Electric Co and Virginia Electric Co.

Protect your Customer..

AS WELL AS YOUR EQUIPMENT

with low-cost, dependable

KEARNEY

TRIP-O-LINK FUSE CUTOUTS

These simple and practical fuse cutouts are economical to install and easy to service. The Trip-O-Link fuse link combines the fuse and cartridge in a single, replaceable unit. Inside the fibrelined cartridge the arc is extinguished less than a cycle after interruption. When the fuse blows, the spring tension holding the fuse is released, speeding arc interruption.

The easy-to-catch contacts exert 30-40 lbs. grip on the fuse cable, but the vertical pressure exerted by spring tension is only 3½ lbs. You get high-pressure contacts without excessive strain on the fuse element.

281

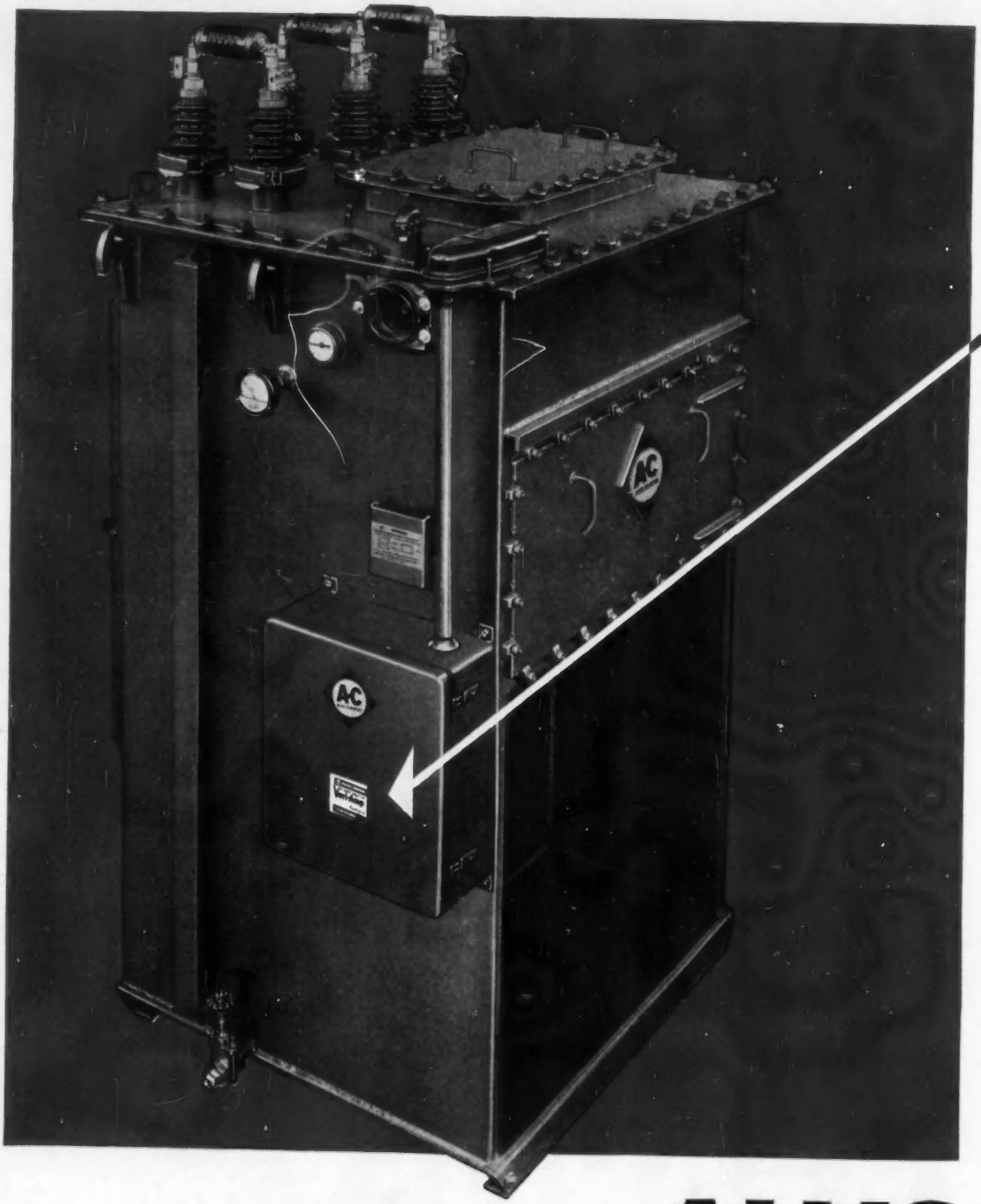
For Better Construction...Safer Maintenance

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. GUELPH, ONT.

Specify **KEARNEY** *The Mark of Quality* **PRODUCTS**

JAMES R. KEARNEY CORPORATION • 4224-42 CLAYTON AVENUE, ST. LOUIS 10, MISSOURI • Canadian Plant GUELPH, ONTARIO

This Seal



ALLIS-

Means - New Economies for Bus Regulation

25 REGULATING COMBINATIONS

This regulator equipped with

Vari-Amp Feature

ALLIS-CHALMERS

Here's how *Vari-Amp* feature lets you meet changing conditions

It's simple to match station regulator capacity to increasing loads with Allis-Chalmers exclusive *Vari-Amp* feature. Whenever greater current capacity is needed, it can be obtained by reducing the range of regulation. Then, the taps on the transformer supplying the regulator can be changed to obtain desired voltages.

Allis-Chalmers power regulators now have five current ratings in a single unit — 25 regulating combinations when you figure unequal ranges. A regulator is no longer the bottleneck to increasing substation capacity — now it can grow with your system.

The example shown in the box below is only one of the many possibilities for improved regulation with the *Vari-Amp* feature. You get it on Allis-Chalmers voltage regulators. Get the full story. Call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

A-4898

Here's One Example:

	Without Vari-Amp	With Vari-Amp
Transformer Voltage	100%	105%
Regulator Range	± 10%	5% to 10%
Bus Voltage	90% to 110%	95% to 110%
Rated Bus Current	100%	126%

ALLIS-CHALMERS Originators of 5/8% Step Voltage Regulators

CHALMERS

A-C ALLIS-CHALMERS

MEETINGS CALENDAR

JANUARY

***EDISON ELECTRIC INSTITUTE**—Residential Lighting Committee, Edgewater Beach Hotel, Chicago, Ill., Jan. 15-17; Dealer Coordination Committee, Chicago, Ill., Jan. 15-17; Financing & Investor Relations Committee, Hotel Biltmore, New York, Jan. 19; Industrial Relations Committee, EEI Headquarters, New York, Jan. 19; Prime Movers Committee, Warwick Hotel, Philadelphia, Pa., Jan. 30-Feb. 1.

PERSONNEL TESTING LABORATORY—14th Personnel Testing Institute, Rensselaer Polytechnic Institute, Troy, N. Y., Jan. 16-20.

OKLAHOMA UTILITIES ASSOCIATION—Accounting Section, Alvin Hotel, Tulsa, Okla., Jan. 20.

AMERICAN SOCIETY HEATING & AIR CONDITIONING ENGINEERS—Annual Meeting, Sheraton-Gibson Hotel, Cincinnati, Ohio, Jan. 23-25.

NATIONAL RURAL ELECTRIC COOPERATIVE—14th Annual Meeting, St. Louis, Mo., Jan. 23-26.

DOBLE ENGINEERING CO—23rd Annual Conference of Doble Clients, Sheraton Plaza Hotel, Boston, Mass., Jan. 23-27.

AMERICAN MANAGEMENT ASSOCIATION—General Management Conference, Fairmount Hotel, San Francisco, Calif., Jan. 24-27.

AMERICAN SOCIETY FOR ENGINEERING EDUCATION—8th Annual College-Industry Conference, Marquette University, Milwaukee, Jan. 26.

***ENGINEERS JOINT COUNCIL**—General Assembly, Hotel Statler, New York, Jan. 26-27.

ELECTRICAL EQUIPMENT REPRESENTATIVES ASSOCIATION—Annual Meeting, Edgewater Beach Hotel, Chicago, Ill., Jan. 26-28.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Winter General Meeting, Hotel Statler, New York, Jan. 30-Feb. 3.

FEBRUARY

EDISON ELECTRIC INSTITUTE—Conference Planning, sponsored jointly with AGA, William Penn Hotel, Pittsburgh, Pa., Feb. 2-3; Commercial Electric Space Heating & Air Conditioning Committee, Atlanta, Feb. 6-7; Industrial Power & Heating Group, Netherland Plaza Hotel, Cincinnati, Feb. 7-8; Transmission & Distribution Committee, Warwick Hotel, Philadelphia, Pa., Feb. 7-8; Electrical Equipment Committee, Homestead, Hot Springs, Va., Feb. 13-14; Commercial Lighting Committee, Hotel Shoreham, Washington, D. C., Feb. 15-16; Residential Promotion Committee, New York, Feb. 16-17; Commercial Cooking & Water Heating Committee, The Atlantic-Biltmore Hotel, Atlanta, Feb. 16-17; Meter & Service Committee, Hotel Cleveland, Cleveland, Ohio, Feb. 20-22.

GREAT LAKES POWER CLUB—LaSalle Hotel, Chicago, Ill., Feb. 2-3.

MISSOURI VALLEY ELECTRIC ASSOCIATION—Industrial & Commercial Sales Conference, President Hotel, Kansas City, Mo., Feb. 2-3.

INDUSTRIAL ELECTRIFICATION COUNCIL—National Industrial Electric Heating Conference, Netherland Plaza Hotel, Cincinnati, Ohio, Feb. 6-10.

***PENNSYLVANIA ELECTRIC ASSOCIATION**—Relay Committee, Benjamin Franklin Hotel, Philadelphia, Pa., Feb. 9-10; Electrical Equipment Committee, Penn Harris Hotel, Harrisburg, Pa., Feb. 9-10; Communications Committee (Winter Meeting), Adelphia Hotel, Philadelphia, Pa., Feb. 13-14; Systems Operation Committee, Hotel Statler, New York, Feb. 16-17; System Planning Committee (Winter Meeting), Hotel Roosevelt, Pittsburgh, Pa., Feb. 20-21.

SOUTHEASTERN ELECTRIC EXCHANGE—Personnel Administration Section, Buena Vista Hotel, Biloxi, Miss., Feb. 9-10.

***NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS**—Annual Spring Meeting, Mayflower Hotel, Washington, D. C., Feb. 17-18.

ROCHESTER ELECTRICAL EXPOSITION—War Memorial Building, Rochester, N. Y., Feb. 18-25.

NATIONAL ADEQUATE WIRING BUREAU—12th Annual Conference, LaSalle Hotel, Chicago, Ill., Feb. 23-24.

AMERICAN MANAGEMENT ASSOCIATION—2nd Annual Electronics Conference & Exhibit, Hotel Commodore, New York, Feb. 27-29.

AMERICAN SOCIETY FOR TESTING MATERIALS—Committee Week, Hotel Statler, Buffalo, N. Y., Feb. 27-March 2.

MARCH

SOUTHERN SAFETY CONFERENCE, INC.—Southern Safety Conference & Exposition, Hotel Biltmore, Atlanta, Ga., March 4-6.

SOUTHEASTERN ELECTRIC EXCHANGE—23rd Annual Conference, Boca Raton, Fla., March 12-14.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS—12th Annual Conference, Hotel Statler, New York, March 12-16.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION—Edgewater Beach Hotel, Chicago, Ill., March 12-16.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Spring meeting, Multonomah Hotel, Portland, Ore., March 18-21.

ILLINOIS INSTITUTE OF TECHNOLOGY—18th Annual American Power Conference, Hotel Sherman, Chicago, Ill., March 21-23.

OKLAHOMA UTILITIES ASSOCIATION—Annual Convention, Biltmore Hotel, Oklahoma City, Okla., March 22-23.

PACIFIC COAST ELECTRICAL ASSOCIATION—Engineering & Operating Section, Palace Sheraton, San Francisco, Calif., March 22-23.

***EDISON ELECTRIC INSTITUTE**—Street Lighting Committee, Minneapolis, March 23-24; 22nd Annual Sales Conference, Edgewater Beach Hotel, Chicago, March 26-29.

APRIL

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—South West District Meeting, Baker Hotel, Dallas, Tex., April 2-4; Great Lakes District, Fort Wayne, Ind., April 16-18.

ELECTRICAL MAINTENANCE ENGINEERS ASSOCIATION—8th National Biennial Electric Industry Show, Shrine Exposition Hall, Los Angeles, Calif., April 5-7.

MIDWEST RESEARCH INSTITUTE—Symposium for Management on Applications of Analog Computers, University of Kansas City, Kansas City, Mo., April 10-11.

POINT OF PURCHASE ADVERTISING INSTITUTE—10th Annual Symposium & Exhibit, Hotel Sheraton Astor, N. Y., April 10-12.

SOUTHEASTERN ELECTRIC EXCHANGE—Engineering & Operation Section, Bon Air Hotel, Augusta, Ga., April 12-13.

EDISON ELECTRIC INSTITUTE—National Conference of Electric & Gas Utility Accountants, sponsored jointly with AGA, Hotel Commodore, New York, April 16-18; Accident Prevention Committee, Sheraton Hotel, St. Louis, April 30-May 2.

GREATER NEW YORK SAFETY COUNCIL—26th Annual Safety Convention & Exposition, Hotel Statler, New York City, April 16-20.

PACIFIC COAST ELECTRICAL ASSOCIATION—Administrative Services Section Meeting, Huntington-Sheraton Hotel, Pasadena, Calif., April 17-18.

MISSOURI VALLEY ELECTRIC ASSOCIATION—Engineering Conference, Hotel President, Kansas City, Mo., April 18-20.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—2nd Conference on Recording & Controlling Instruments, Bradford Hotel, Boston, April 26-27.

MAY

NATIONAL FARM ELECTRIFICATION CONFERENCE—LaSalle Hotel, Chicago, Ill., May 1-2.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—North Eastern District Meeting, Rochester, New York, May 2-4.

AIR-CONDITIONING & REFRIGERATION INSTITUTE—Annual Meeting, The Homestead, Hot Springs, Va., May 7-9.

PACIFIC COAST ELECTRICAL ASSOCIATION—Annual Convention, Las Vegas, Nevada, May 14-16.

PENNSYLVANIA ELECTRIC ASSOCIATION—Relay and Electrical Equipment Committees, Hotel Roosevelt, Pittsburgh, May 17-18.

* Additions this week

Checking the weight of Pole Star cores requires but a momentary stop on the conveyor line — a pause that pays off in core uniformity and positive assurance of low flux density.

He's weighing the proper **flux density** into a POLE STAR core — Here's why . . . .

Flux density of the core (number of magnetic lines per square centimeter) is worth dollars and cents to the user of distribution transformers. High flux density means high exciting current, which, when multiplied by hundreds or thousands of transformers on the line, can increase distribution costs.

Because flux density is dependent upon the amount of steel used in the core, Pennsylvania Transformer Company has set up an effective system of checks to make certain that every lap-on-top Pole Star core contains the proper amount of steel. Laminations are counted, the core is measured, and then — because there can be minute but important variations in the steel itself — the core is *weighed* to provide a beyond-a-shadow proof that the *right* amount of steel has been used in each Pole Star core.*

That's why, with Pole Stars, you get proper flux density and low exciting current *every time.*

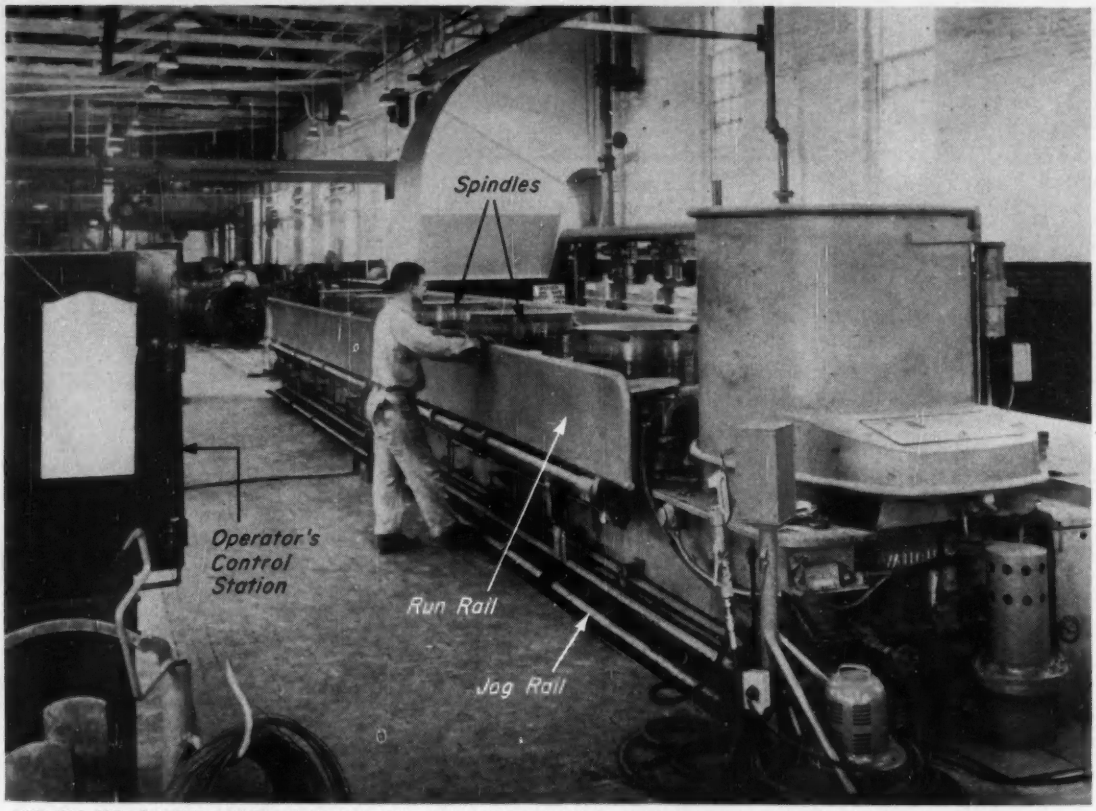
**This extra precaution precludes, for example, any possible variations in the cores as a result of slight "wrinkles" in the steel, or as a result of otherwise unnoticeable discrepancies in the insulating coating of the steel.*

167 Production Controls make Pole Star best!

PENNSYLVANIA TRANSFORMER COMPANY

A McGraw Electric Company Division **CANONSBURG, PA.** *Greater Pittsburgh District*

Pole Star Transformers are available in all standard single phase distribution sizes from 3 through 500 kva, through 67,000 volts.



THE SIX SEPARATELY DRIVEN SPINDLES ON THIS WIRE DRAWING MACHINE ARE CONTROLLED EASILY BY RHEOSTATS

Special Controls Rule Wire Machine

INDUSTRIAL Design

Duplicate switches in parallel, dancer rheostats, and synchronous motor-driven m-g set provide precise power for wire drawing

D. E. DONALDSON, Control Engineer, Electric Controller & Mfg Co, Cleveland, Ohio

Electric controls are playing a vital role in the wire drawing operation at the Trenton works of American Steel & Wire Division, United States Steel Corp.

A 6-spindle wire drawing machine is being used to draw wires for cables of the center suspension span of the new Straits of Mackinac bridge at St. Ignace, Mich. This dc machine is powered through an m-g set driven by a synchronous motor.

To serve the wire drawing machine and the m-g set, a specially designed circuit breaker panel, motor controller for the wire block machine, and an automatic synchronous motor starter for the m-g set have been necessary.

The wire block machine and controls can draw wire from 0.350 in. down to 0.186 in. at speeds up to 700 fpm. It uses six separately motored spindles to pull wire through six successive dies. Several wraps of wire are taken around each spindle to permit the wire to dissipate heat from the preceding die before it enters the next die.

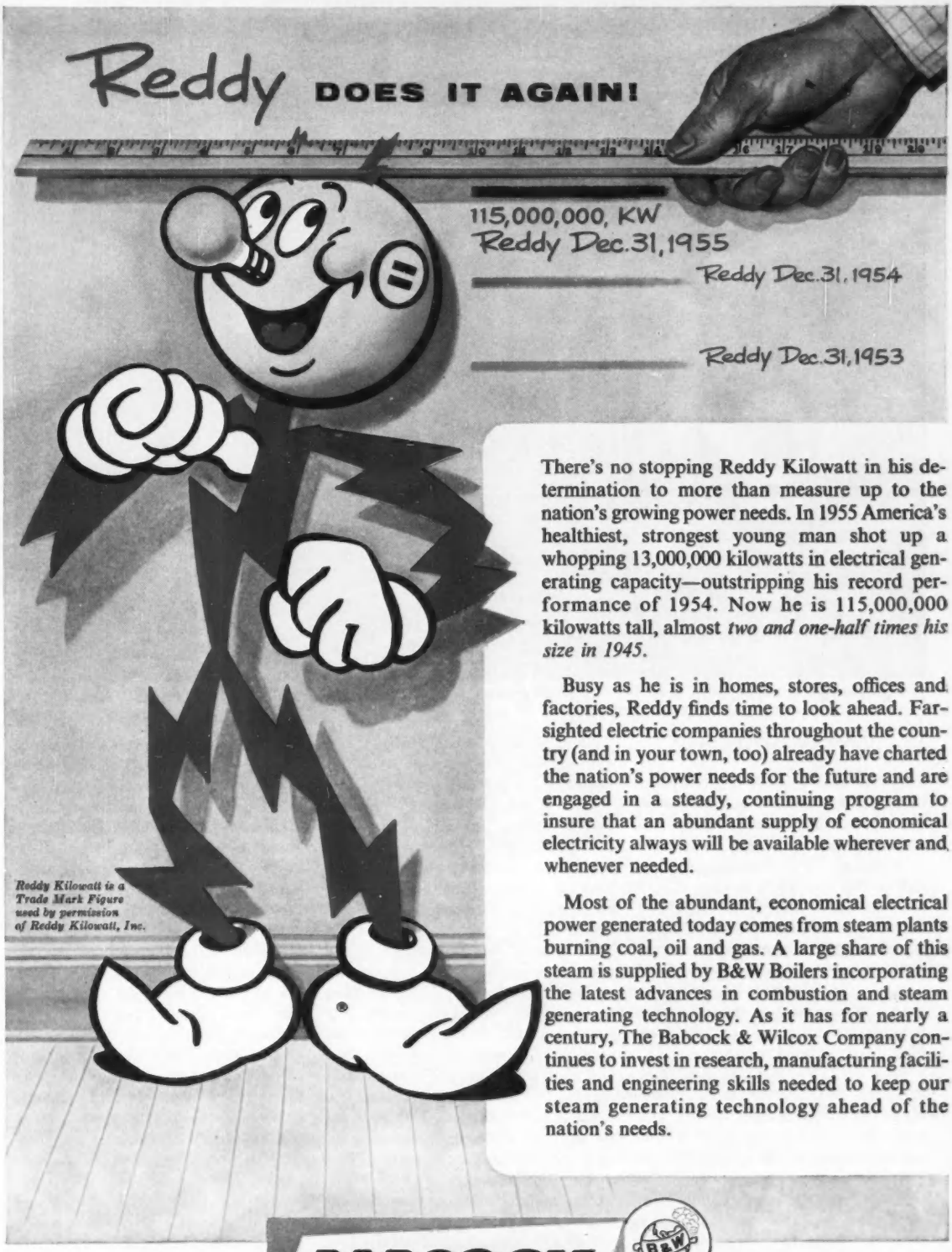
The finished wire is spooled on a frame on the final spindle. Sufficient capacity is provided here to permit a large bundle to build up before the machine must be unloaded.

A 400-v, 3-phase, 60-cps power supply for the machine is provided through a 1,600-amp manually operated air circuit breaker mounted in a separate cabinet enclosure.

Dc power for the six individual spindle motors is generated by a 3-unit m-g set that is driven by a 725-hp, 1,200-rpm synchronous motor. A full-voltage synchronous motor starter is used to bring up to speed and synchronize this low-current-inrush (400%) drive motor. The starter consists of a triple-pole main contactor with dc-coils energized through rectifiers; a field contactor that applies dc to the motor field; a polarized frequency relay that controls the field switch; and various protective devices, meters, and resistors. Thermal-magnetic relays protect the motor against overloads.

Individual spindle motors of the machine are of the shunt-wound dc variety, having stabilizing fields. The

(*Continued on page* 46)


Reddy DOES IT AGAIN!
115,000,000, KW
Reddy Dec.31,1955
Reddy Dec.31,1954
Reddy Dec.31,1953
Reddy Kilowatt is a Trade Mark Figure used by permission of Reddy Kilowatt, Inc.

There's no stopping Reddy Kilowatt in his determination to more than measure up to the nation's growing power needs. In 1955 America's healthiest, strongest young man shot up a whopping 13,000,000 kilowatts in electrical generating capacity—outstripping his record performance of 1954. Now he is 115,000,000 kilowatts tall, almost *two and one-half times his size in 1945.*

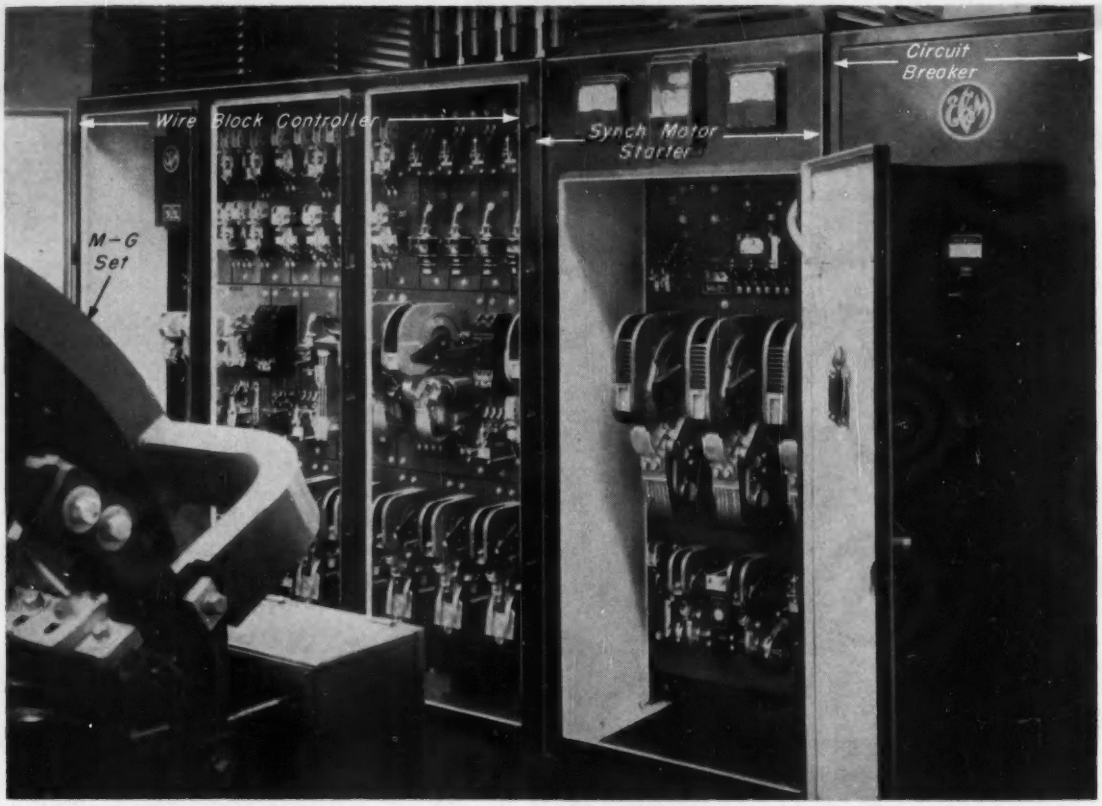
Busy as he is in homes, stores, offices and factories, Reddy finds time to look ahead. Farsighted electric companies throughout the country (and in your town, too) already have charted the nation's power needs for the future and are engaged in a steady, continuing program to insure that an abundant supply of economical electricity always will be available wherever and whenever needed.

Most of the abundant, economical electrical power generated today comes from steam plants burning coal, oil and gas. A large share of this steam is supplied by B&W Boilers incorporating the latest advances in combustion and steam generating technology. As it has for nearly a century, The Babcock & Wilcox Company continues to invest in research, manufacturing facilities and engineering skills needed to keep our steam generating technology ahead of the nation's needs.

BABCOCK & WILCOX

BOILER DIVISION

N209



SYNCHRONOUS STARTER PUTS M-G SET TO WORK; WIRE BLOCK CONTROLLER RESPONDS TO PUSHBUTTON ORDERS

(*Continued from page* 44)

generator that supplies dc power to these motors is rated at 500 kw at 230/345 v. A running voltage between 80 and 345 v may be selected by means of the main generator rheostat at the operator's control station near the finish end of the machine. This voltage setting determines drawing speed and compensates for various types of wire being drawn.

Jogging voltage may be varied between 50 and 120 v by adjustable resistors mounted in a frame with other field circuit resistors.

Another 25-kw generator unit supplies the dc-excitation requirements of all shunt fields and control circuits. Its output is governed by an exciter rheostat at the operator's control station.

Motor speeds between the base speed and top speed are manually controlled by a rheostat in the field circuit of the final No. 6 spindle motor. This rheostat setting determines the field weakening of the No. 6 motor. The field weakening of each preceding motor is controlled automatically by dancer rheostats actuated by the loop of wire between the individual die blocks on the machine.

Thus if the No. 6 spindle motor is accelerated, the dancer rheostat controlling No. 5 motor is actuated, causing No. 5 motor to accelerate also. This, in turn, affects No. 4 motor rheostat, etc. Deceleration is handled similarly.

Because of the great length of the wire block machine, it is built in two sections. Each section has three dies, three spindles, and three motors. Jog speed and run speed switches were duplicated to save the operator time and effort. Switches are connected in parallel so the operator can start the whole machine at once. The jog speed switches are actuated by foot rails on each section of the machine. This enables the operator to use both hands while making adjustments before actual wire drawing begins.

Run speed switches are actuated by similarly located hand rails. When the jog or run speed switches are closed, contactors in the wire block motor controller cabinet close the proper generator circuits to the spindle motors. The run speed switch hand rail is positioned so that if the operator should become caught and dragged against the machine while it is running, his body will force the hand rail into the "stop" position.

Full motor field strength is maintained when the machine stops. This prevents uncontrolled roll-back and consequent loosening of the wire. However, a roll-back switch and resistor enable the operator to weaken the No. 6 spindle motor field so that this final spindle can be turned manually when desired.

The circuit breaker panel, synchronous motor starter, and wire block motor controller are mounted in separate enclosures within a control house in a basement room below the machine. The control house also contains the 3-unit m-g set.

When all the wire is drawn and each of the two 24-in. suspension cables are completed, each cable will consist of 12,920 strands of 0.196-in. galvanized high tensile bridge wire wrapped with a thread-layer cover of lower tensile galvanized wire. The two cables will total 24 million lb.

CUT DOWN INSTALLATION TIME² with

BLACKBURN TWO-BOLT CLAMPS

One piece construction simplifies installation—eliminates assembly problems—no falling parts—no missing pieces—no special tools necessary. Available in copper or heavily tin plated—with or without contoured spacer.

Long bolt is peened, capturing spacer and top casting. Spacer is ringed and swings easily over conductor. Free bolt is held in place by neoprene washer during installation.

Contoured spacer keeps conductor in original shape and distributes unit pressure over large area of conductor, minimizing cold flow and provides wide separation between the aluminum and copper conductor, reducing possibility of galvanic corrosion.

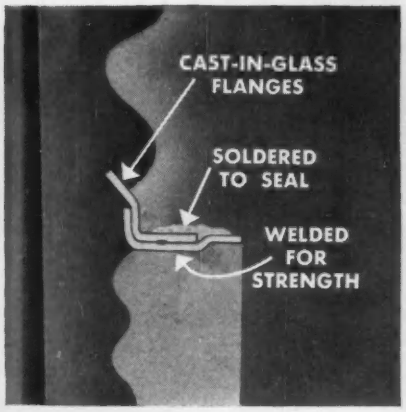
Shakeproof washers prevent loosening under the most severe operating conditions. Washers, castings, bolts and spacers are of copper alloy, completely tin plated.

Write today for complete specifications and prices on Blackburn Two-Bolt Clamps.

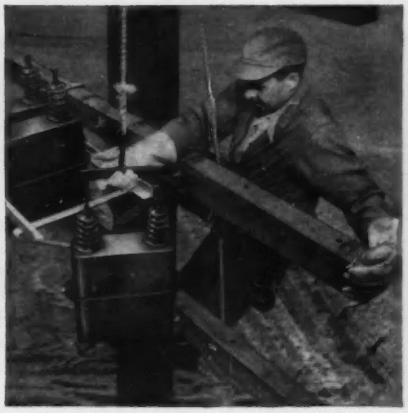
JASPER BLACKBURN CORPORATION
35 MADISON • ST. LOUIS, MO. • PHONE: MAIN 1-2821

BUSHING STRENGTH TEST*: Here's a graphic demonstration of the ability of G-E capacitor bushings to take stresses from all directions. The upper bushing on the top capacitor withstands a sideways strain totalling the combined weight of all four capacitors—with no damage to the bushing or the seal.

* Not recommended practice.



WELDED FOR STRENGTH cast-in-glass metal flanges provide a strong, metal-to-metal bond. Soft solder is used only for assuring hermetic seal.



G-E BUSHINGS CAN'T PULL OUT: Handy lifting hook above is used as a convenient way to hoist capacitors. Tests show that bushings easily support several times capacitor weight without damage to seal.

ROUGH HANDLING is common even when capacitors are roped as above. G-E bushings can't twist out under stresses or rough handling by linemen.

Capacitors get rough handling, and G-E capacitors can take it

Unique welded and soldered bushing construction maintains hermetic seal even under lateral stress

Capacitors are constantly being hoisted onto trucks, off of trucks, and up on poles . . . and it's only natural for linemen to grab the units by their bushings. That's why G-E capacitor bushings are built to withstand stresses in all directions without damage to the hermetic seal.

This extra strength of G-E bushings stems from their unique construction. Specially made, low-expansion glass is cast to metal flanges having the same coefficient of expansion. The flanges are welded to the capacitor case for mechanical strength, and soldered for a positive, air-tight, moisture-tight seal. The result is a capacitor and a bushing that are virtually the same integral part.

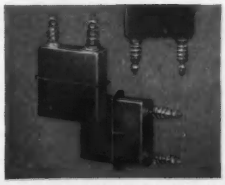
This extra strength means more than just the ability to withstand rough handling during shipment and installation. It means longer service and a permanent hermetic seal in spite of all-directional stresses due to temperature and humidity variations. Hermetic sealing means that the impregnant stays in and air and moisture stay out of the capacitor, thus minimizing the two chief causes of expensive capacitor failures.

Write for a detailed description of "Engineered Extras" in the 16-page capacitor bulletin, GEA-6260, to the General Electric Company, Section 441-27, Schenectady 5, N. Y.

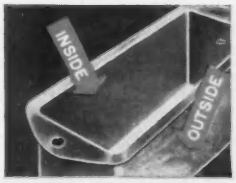
Progress Is Our Most Important Product

GENERAL ELECTRIC

ONLY G-E CAPACITORS HAVE ALL THESE Engineered Extras AT NO EXTRA COST

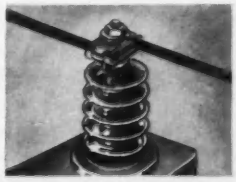


MOUNTED IN ANY POSITION G-E capacitors maintain uniformly high efficiency.



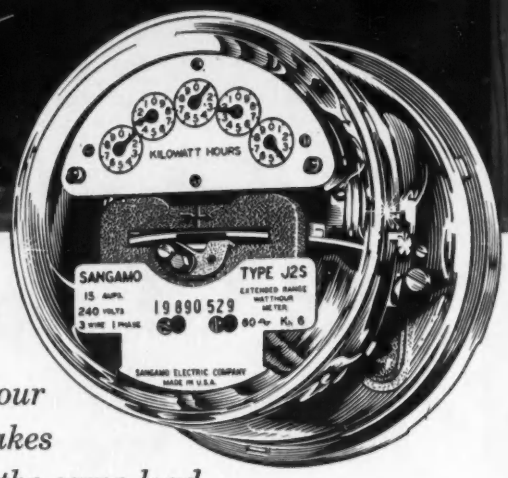
CORROSION-RESISTANT CASE, tin plated inside and outside, prolongs capacitor life.

SMALLER AND LIGHTER, than any other make, for easiest handling and installation.



NEW TERMINAL ASSEMBLY with Belleville washers gives lasting contact pressure.

the slow speed of the Sangamo J2 watthour meter adds years to its life



SLOW SPEED... that's one difference between the Sangamo J2 and other watthour meters. The disk of the J2 makes fewer revolutions to measure the same load.

What the J2's fewer revolutions mean in terms of one year's time...

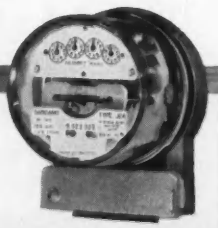
The disk of the J2 revolves 166⅔ times to measure one kilowatt hour. Other meters make 277.7 revolutions to measure a kilowatt hour.

This year's average residential load will be approximately 3000 kilowatt hours. If you multiply this figure by 277.7, you get 833,100 —the number of revolutions a 3.6 constant meter makes in measuring 3000 kilowatt hours.

When we multiply 3000 kilowatt hours by 166⅔, the speed of the J2, we get 500,000. The difference between 500,000 and 833,100 is 333,100. In other words, the J2 makes 333,100 *fewer* revolutions in a year's time to measure the same load! 333,100 *fewer* revolutions to cause wear on moving parts. Think what it would add up to in 30 years!

That's why we say "the slow speed of the Sangamo J2 adds years to its life."

JM56-1

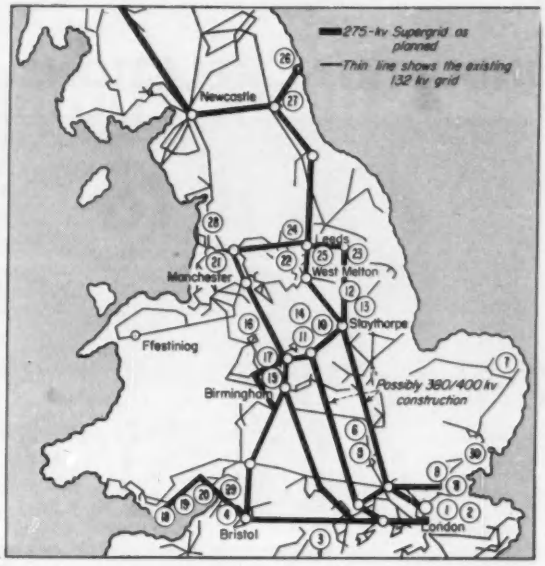


SANGAMO ELECTRIC CO.

SPRINGFIELD, ILLINOIS

Power Capacity Tops Demand in England as . . .

- CEA assures no more shortages in future
- 1.7-million kw capacity installed in 1955
- $1.7-billion expansion program underway
- 45% increase in generation set for 1955-60



Electric generating capacity in England has finally caught up with demand. The country's Central Electricity Authority expects new capacity being installed to keep ahead of anticipated demand.

CEA is in the midst of a $1.7-billion expansion program which will take it up to the end of 1960. A record amount of new generating capacity, totaling 1.7-million kw, was installed last year and CEA expects power cuts to be a thing of the past.

Last winter for the first time, the Regional Boards for Industry did not have to request firms to cooperate in load-spreading. It was not considered necessary to meet peak demand.

Britain's power deficiencies go back to the war, but as they have been made good it has become possible to meet demand for electricity without imposing restrictions. But although no restrictions were requested of firms, the shortage of generating capacity was still such that the maximum potential demand was estimated to be greater than generating capacity available.

The 1955-60 program is intended to increase generating capacity by over 45%. This will meet the doubling of demand which it is estimated will take place every ten years now.

The 18,250,000 kw that was available at the end of 1954 will be increased to 26,650,000 kw at the end of 1960, a net gain of 8,400,000 kw.

Actually, the building program will result in the installation of 11,070,000 additional kw. But the net increase figure is smaller because about 1,885,000 kw of plant will be closed down either because it is unserviceable or uneconomic or to make way for new plant; and secondly, because of the capability of newly installed capacity.

CEA is achieving economies in a number of ways in its building program. The trend is toward installing larger generating units which take up less room per kw installed.

Further, it is now cheaper to take electricity to areas of demand than it is to take coal any distance by rail to power stations. Thus, a large number of the new stations are located on or near the East Midlands coalfields. Where they have been situated on estuaries or by the sea, they can be reached relatively cheaply by collier and tanker. And these stations also can eliminate costly cooling towers.

CEA estimates that greater efficiency of new plants has meant a saving of 17.5-million tons of coal, valued at about $159 million. And this factor is still vital to England as coal-fired plants are expected to carry the bulk of demand for the next 20 years. Although the first two CEA atomic power stations should be operating by 1960-61, the amount of power they will be feeding into the grid will be comparatively small. Some oil-fired capacity is also being installed.

Installation of more modern and efficient generating plant is also expected to enable the power industry to increase maximum available capacity.

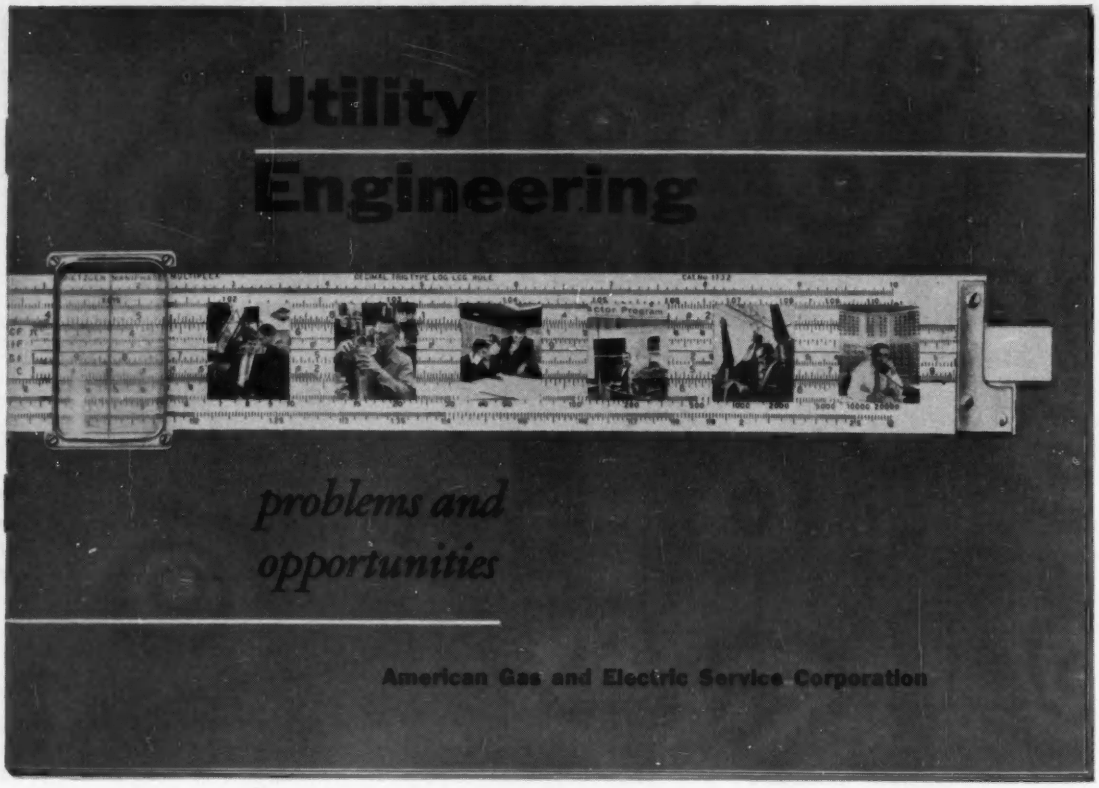
Stations, with kw capacity, being built or planned by Britain's CEA:

1. Belvedere, 360,000*
2. Northfleet, 360,000
3. Marchwood, 480,000*
4. Portishead B, 360,000*
5. Goldington, 180,000
6. Little Barford B, 120,000
7. South Denes, 120,000*
8. Tilbury A, 360,000*
9. West Thurrock 200,000*
10. Castle Donington 600,000
11. Drakelow B, 480,000
12. High Marnham, 400,000
13. Staythorpe B, 240,000
14. Willington A, 400,000
15. Hams Hall C, 360,000
16. Meaford B, 240,000
17. Rugeley A, 240,000
18. Aberthaw, 200,000
19. Rogerstone, 120,000
20. Uskmouth B, 240,000
21. Bold B, 120,000
22. Elland, 180,000
23. Ferrybridge B, 300,000
24. Skelton Grange B, 300,000
25. Wakefield B, 240,000
26. Blyth, 480,000
27. Stella North, 240,000
28. Fleetwood, 90,000

Atomic Power projects:

29. Berkeley, 120,000-200,000
30. Bradwell, 120,000-200,00

*Stations equipped for oil-firing.



This new illustrated booklet aids . . .

AG&E Program to Recruit Engineers

In an effort to attract engineering students and graduates into the electric utility engineering field, American Gas & Electric system has recently published a booklet, "Utility Engineering —Problems and Opportunities."

The booklet, intended to supplement other recruiting efforts of the AG&E system, is an illustrated reproduction of a talk on the same subject made by President Philip Sporn in Columbus, Ohio, last spring.

It includes 12 photographs showing recent graduates filling a variety of positions typical of engineering opportunities available in the electric utility field.

The booklet first takes up the four most common objections to a career in electrical utility engineering: That there are few "problems of any size, complexity, or significance" in the field; that if any problems did exist in the past, they have already been solved, "so that all there is to do today is to go to a report or a bookshelf and take down the solution . . ."; that all new engineering is done by "electrical and mechanical and other manufacturers"; and that there is no "glamour" in the electric utility engineering field.

Names Opportunities Available

These objections are combatted in the booklet with fact-filled articles on subjects such as "What Electrical Utility Engineering Involves; "Opportunities in Utilities Engineering," (covering fields of atomic power, fossil fuels, transmission of electric energy, and energy utilization); "Economic Index of Opportunities Available;" and economic significance of the electrical utilities to the economy of the United States.

Copies of the booklet are being distributed to 45 colleges in the general recruiting areas of the operating companies of the AG&E system, and of the Service Corp.

The company also plans to use this booklet for selected high school groups in connection with career counseling of interested students.

Other recruiting efforts of the AG&E system include visitations to about 45 colleges in the Mid-West, South, and Northeast; plant visits by students and faculty members; talks to student groups, such as AIEE chapters; making available to colleges photographs, films, and other visual aids; summer employment of undergraduates; and participation in "career day" conferences.

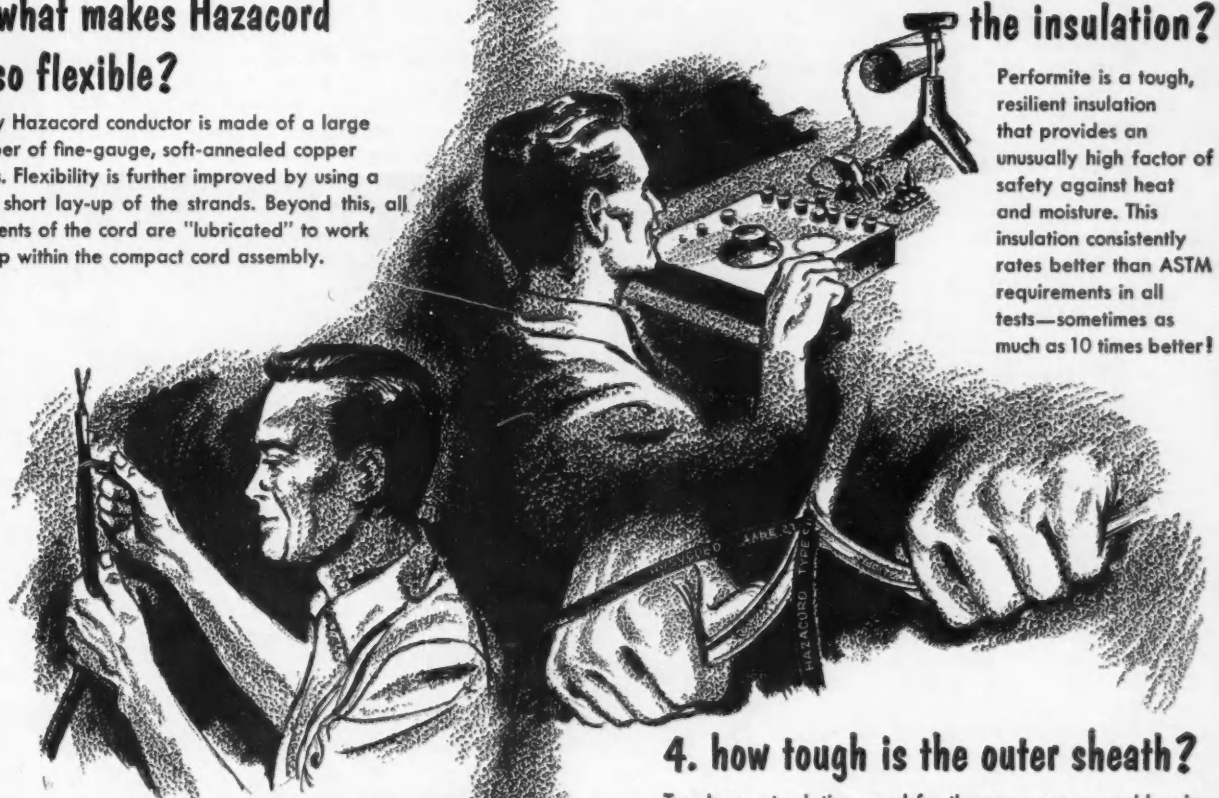
4 points about HAZACORD ...that every cord buyer should know

1. what makes Hazacord so flexible?

Every Hazacord conductor is made of a large number of fine-gauge, soft-annealed copper wires. Flexibility is further improved by using a very short lay-up of the strands. Beyond this, all elements of the cord are "lubricated" to work or slip within the compact cord assembly.

2. what's so special about the insulation?

Performite is a tough, resilient insulation that provides an unusually high factor of safety against heat and moisture. This insulation consistently rates better than ASTM requirements in all tests—sometimes as much as 10 times better!



3. what's the purpose of fillers?

They fill out the construction, protecting the insulation from damage by crushing, and give additional longitudinal strength for pulling or suspension. In Hazacord, these fillers *completely* fill in the area between conductors without lessening flexibility.

4. how tough is the outer sheath?

Tough as a truck tire—and for the same reason: mold-curing of a properly designed compound. Every foot of the specially-compounded Hazaprene ZBF Sheath is cured in a metal mold. Result: a protective sheath that's tough enough to take just about any kind of treatment in service.

3398

Complete information in Bulletin H-451. Hazard Insulated Wire Works, Division of The Okonite Company, Passaic, New Jersey.

HAZACORD mold-cured PORTABLE CABLES

PRODUCT OF OKONITE RESEARCH

Bad Wiring Epidemic

(*Continued from page 31*)

goal was to educate the general public and to stimulate public demand for adequate wiring in new construction and for wiring modernization in existing buildings. In this respect the program is a long-term affair, and the promotion of adequate wiring will continue to have high priority as long as inadequate wiring persists.

"Magic Link" Pulls Well

Probably the most effective tool we have had for our educational work in adequate wiring has been our sound-color movie, "The Magic Link." Since this film was brought out in mid-1954, we have shown it more than 1,600 times to about a quarter of a million customers. A substantial backlog of requests for "Magic Link" showings promises continued effective use of this promotional device for a long time.

The film has been shown locally in private and public schools, at the high school and college levels, to consumer groups, service clubs, civic associations, and even in apartment house lobbies on request from the management. To date, 214 prints have been bought by 110 other companies in 40 states, the District of Columbia, Puerto Rico, and Canada.

Brochures, Training Centers

Our adequate wiring message is carried in an educational booklet, "ADEQUATE WIRING—The Magic Link to Electrical Living," more than 290,000 copies of which have been distributed. A similar publication was slanted for builders, and recently a new brochure, "Wiring News," has been added for circulation in the real estate management field.

Two new service training centers which we established recently, and a third which will open this month, provide additional media for bringing adequate wiring to the attention of people in the contracting and construction field. Mock-ups of adequate electric service installations at these centers carry the message home.

We have promoted adequate wiring repeatedly on the television and radio programs we sponsor over New York City and Westchester stations; on city transit system and commuter train car cards, billboard posters, truck posters for our own fleet; and in show window and floor displays. The same applies to our metropolitan press, community weekly, Chamber of Commerce, and real estate publication advertising.

In addition to its obvious significance to us as the local electricity supplier, adequate wiring has proved to be big business for local electrical and contracting industries. Public demand for adequate wiring in New York City alone in these two years already has brought about investment of more than $50 million in new equipment and labor. And, of course, it has opened up a larger market for electric appliance sales, the chain effect of which follows merchandising channels from the local dealer back to the manufacturer.

Based on the progress of the past two years, we are confident that the future holds even greater adequate wiring gains in store. And everyone will benefit from it. This includes first and foremost the general public.

78 Saskatchewan Towns Go to Mercury Vapor

Mercury vapor street lighting is catching on fast in scores of small towns and villages in the Canadian province of Saskatchewan.

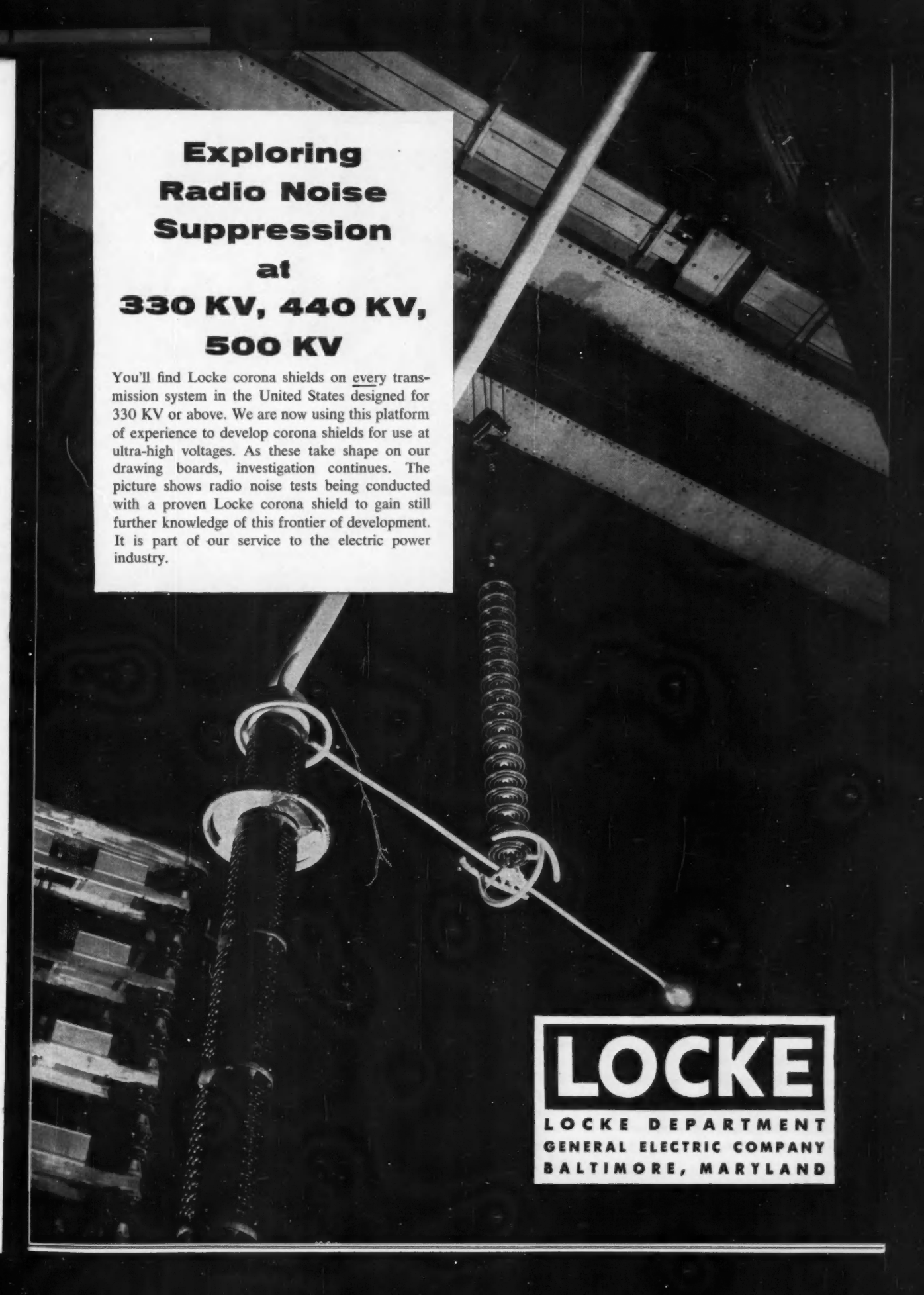
Modernization of old installations came to these communities only a couple of years ago. Since 1954, when mercury vapor lighting was first used on a large scale in Estevan near the U.S. border, 78 urban centers have made a complete switchover.

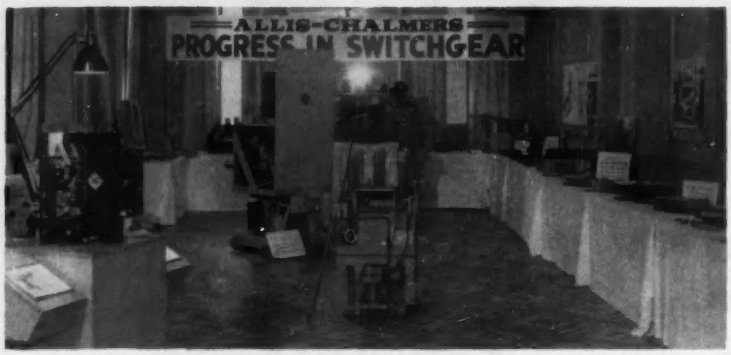
Humboldt (population 2,435), for example, has 107 mercury vapor street lamps in operation. Only Saskatoon, with 57,000 population, has more installations.

All mercury vapor lamps being installed by the Saskatchewan Power Corp are 125-w units imported from The Netherlands. Each lamp produces an intensity of 6,000 lumens.

Builders Learn Facts of Light

To light condition more homes in its area, Union Electric Co of Missouri believes in "light conditioning" the people who build them, too. Here, 50 electrical contractors and home builders from the St. Louis area board a plane for General Electric Co's Nela Park for a one-day discourse on lighting methods and developments. Union Electric foots the bill. With return of a buyer's market to the home building field, it figures good lighting can get a responsive ear from sales-hungry builders if they are shown how it can set off their homes from the competition's. This trip, made last month, is the third the company has sponsored. First one in 1953 made such a hit that it has become an annual affair. Union Electric figures the cost to run about $50 per person.


Exploring
Radio Noise
Suppression
at
330 KV, 440 KV,
500 KV
You'll find Locke corona shields on every transmission system in the United States designed for 330 KV or above. We are now using this platform of experience to develop corona shields for use at ultra-high voltages. As these take shape on our drawing boards, investigation continues. The picture shows radio noise tests being conducted with a proven Locke corona shield to gain still further knowledge of this frontier of development. It is part of our service to the electric power industry.
LOCKE
LOCKE DEPARTMENT
GENERAL ELECTRIC COMPANY
BALTIMORE, MARYLAND



A-C Holds Switchgear Demonstrations

Utility, consulting and industrial engineers can inspect switchgear components at a series of demonstrations being conducted by Allis-Chalmers Manufacturing Co.

Almost every component or sub-assembly of outdoor or indoor switchgear is uncovered for examination, and in some cases, operation. The various displays are explained to invited customers in small groups by A-C switchgear department and district office representatives.

Results of GE's Insulation Study

. . . show that basic insulation level in transformers can be safely reduced 2 steps for industry savings of $15 million in 5 years

How far can insulation level be safely reduced in high-voltage power transformers, 138 kv and up?

General Electric engineers in Pittsfield, Mass.—after studying the problem in their high-voltage laboratory and with five years of field experience —have reached these conclusions:

1. Transformers for many systems can have their insulation levels reduced two steps below the full BIL (basic insulation level) without sacrificing reliability.

2. New data on switching surges and insulation life make the two-step reduction practical. Lightning or pulse surge strength is no longer a critical problem in transformer design, thanks to modern lightning arresters.

3. Transformer costs can be cut, with indicated industry-wide savings of $15 million in the next five years.

Buyers of high-voltage power transformers usually specify insulation reduced one or one and one half steps below full BIL. This saves up to 25% in initial cost, since lower insulation reduces transformer size and weight as well as impedance and losses.

The two-step reduction would save about 10% more, according to General Electric's study. This would amount to about $15 million during the next five years on estimated purchases of 30 million kva of transformers 230 kv and higher.

More information in the research findings is expected soon and the company is preparing to recommend the two-step-down principle for high-voltage power transformers.

Plan $1-Million Facility

Brown Boveri Corp of New York broke ground recently for a $1-million service-center and warehouse on a 24-acre tract within North Brunswick, N. J., Township. The firm, manufacturer of generating and distribution equipment, stated that the building is slated for operation in the fall.

Armor-Grip Suspension Developed by PLP

An armor-grip suspension, which "floats" a conductor in a "clamping" region, is a development of Preformed Line Products Co, Cleveland, Ohio.

With this device the ACSR and all-aluminum conductor is cradled in a Neoprene sleeve, "caged" in expanded armor rods, and carried in a conical shaped aluminum alloy casting. Conductor shifting and clamping stresses are said to be eliminated.

Square D, EC&M Complete Merger

Square D Co and Electric Controller & Manufacturing Co formally began operations Jan. 4 as a merged corporation. Shareholders of both had previously approved the merger (EW, Jan. 2, p 7).

Square D, as the surviving company, will operate EC&M as a separate division and becomes one of the nation's largest manufacturers of electrical distribution and control equipment. For information on the new officers of the merged companies, see page 36 of this issue.

EC&M will remain at its recently completed 340,000-sq ft plant in Cleveland. Square D has plants at Detroit, Milwaukee, and Los Angeles totaling 1.5-million sq ft and assembly plants in five other U. S. cities, Toronto and Mexico City.

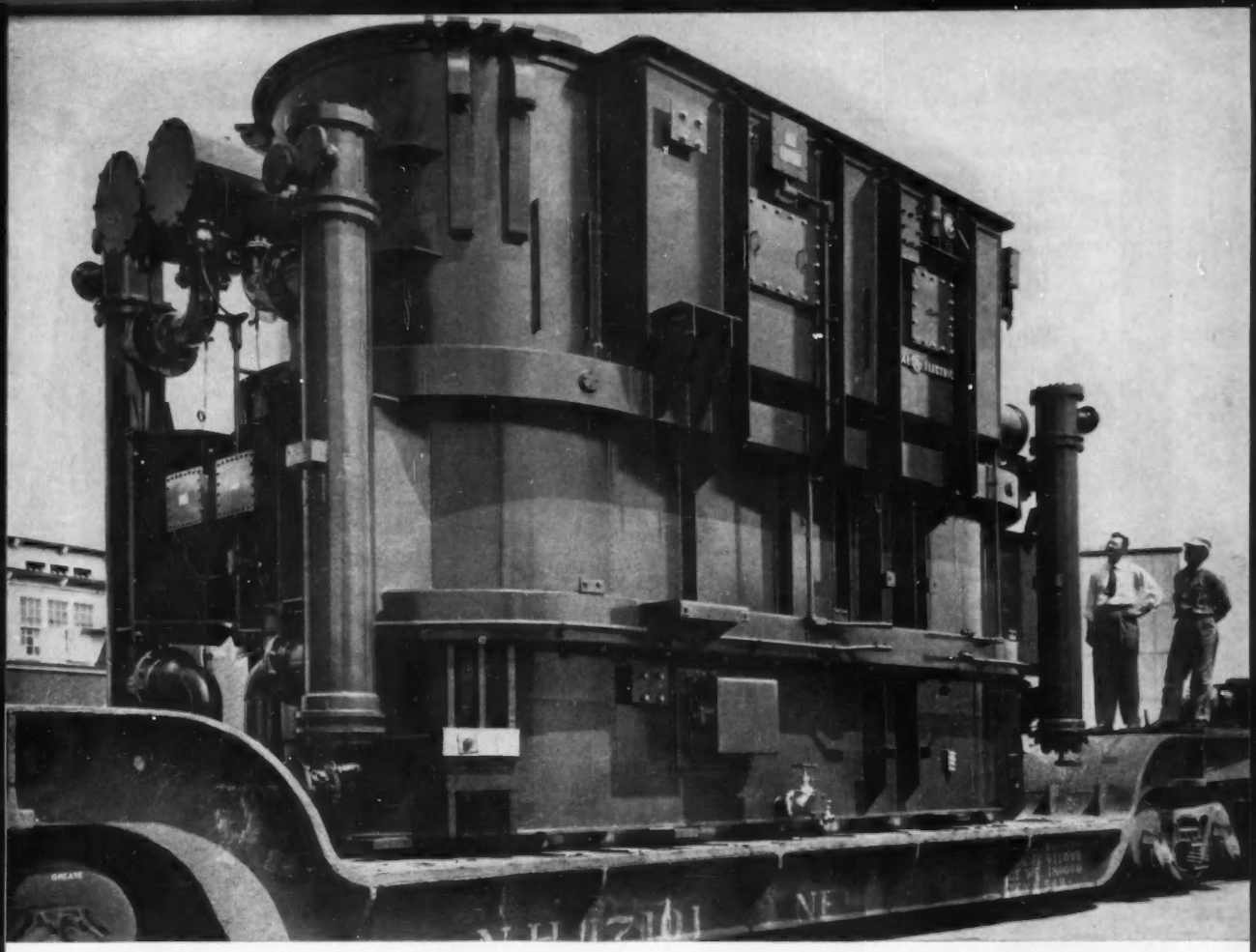
The company's Sales Division maintains 78 field offices in principal North American cities and recently formed a marketing subsidiary to service the British Isles and Europe.

Offer Creosote Analysis for Older Pine Poles

A service is available for statistically sampling creosote retention under various conditions in older pressure treated pine poles. It is described in a data sheet issued by Osmose Wood Preserving Co of America, Inc., Buffalo, New York.

This service, the company's Utilities

(*More M&M on page 59*)



LARGEST FOW TRANSFORMER PROVIDES IMPORTANT SAVINGS

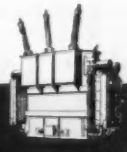
A midwestern utility realized important savings when it purchased this General Electric 275,000-kva, 132-kv, FOW (Forced-Oil-Water-Cooled) power transformer. Shipped late last year, this unit is believed to be the largest of its type ever built.

The savings were:

1) Reduced first cost. The price of this FOW transformer was less than that of like-rated units with any other type of cooling. The total annual cost, including the evaluation of losses, is also lower.

2) Reduced installation cost. All cooling equipment was shipped in place. Only moving to site, oil filling, plus installation of water connections and bushings were necessary before energizing. Upright shipment in a one-piece tank speeded handling.

Where adequate water exists, the economics point to increased use of FOW transformers. For further information on these units, contact your G-E Apparatus Sales representative or write to Section 421-38, General Electric Company, Schenectady 5, N. Y.



Power Transformer NEWS

Progress Is Our Most Important Product

GENERAL ELECTRIC

Choose from a wide range of standard Alcoa® Aluminum Bus Conductors for light, corrosion-resistant, economical bus systems

Whatever your installation or bus design problem is, there's an Alcoa Aluminum Bus Conductor so right for the job it's almost custom fabricated. Alcoa has developed shapes, alloys and tempers to meet the mechanical and electrical requirements for any bus conductor application.

Let us help you design your job in aluminum to get the most out of the many available types of Alcoa Aluminum Bus Conductors. Ask your nearest Alcoa sales office for assistance or address Aluminum Company of America, 2306-E Alcoa Building, Mellon Square, Pittsburgh 19, Pennsylvania.

Tensile properties of Alcoa Aluminum Bus Bars are checked on this Baldwin-Southwark tension-testing machine, periodically calibrated to assure precision.

A precision potentiometer records the voltage drop on test sections of Alcoa Aluminum Bus Bar in the Massena, New York, laboratories, world's largest facility for aluminum conductor research.

Your Guide to Aluminum Value

ELECTRICAL CONDUCTOR MADE OF ALCOA® ALUMINUM

ALUMINUM COMPANY OF AMERICA

©ALCOA

ALWAYS USE ALCOA ALUMINUM ACCESSORIES WITH ALUMINUM CONDUCTORS

Offer Creosote Analysis

(*Continued from page* 56)

Division advises, includes a trained forester to extract borings of selected pine poles in the field. These borings are then analyzed in the company's laboratory for creosote retention and findings are plotted on a graph.

After a correlation between age, retention and location, certain poles can then be treated in place to gain additional years of life.

Cope and Instrof Move to Collegeville Plant

T. J. Cope, Inc, and its wholly owned division, Instrof Corp, have moved manufacturing operations from Philadelphia to Collegeville, Pa.

The Collegeville plant will double production space and output for Cope. The latest material handling equipment and a mechanized assembly line highlight the new operations.

Plans call for sales and executive offices to be moved to Collegeville in April. Until then orders should be sent to the Philadelphia offices at 711 S. 50 St.

Pamphlet Compiles Data on All Nuclear Reactors

Significant data on all known nuclear reactor projects is compiled in a pamphlet published recently by Raytheon Mfg Co, Waltham, Mass. All projects in the world, whether in operation, under construction, or in planning stage, are reportedly listed.

The chart presents up to 50 principal characteristics for each of the nearly 100 reactors listed. These characteristics include function, builder, location, and important technical features.

The pamphlet can be obtained from the company for 50¢ a copy.

U. S. Aluminum Production

Production of primary aluminum in the United States, reports the Aluminum Association in New York, totalled 133,689 tons in November 1955. This is an increase of more than 12,430 tons for same month in 1954, but about 1,000 tons decrease from October, 1955. Total production for the 11 months in 1955 was approximately 1,425,000 tons, an increase of 91,500 tons over the same period in 1954.

I-R Applies Torsion Bar to Torque Control Tool

A tool that will run a nut to any desired torque and automatically shut itself off was introduced recently by Ingersoll-Rand Co, New York, N. Y. Known as the Torque Control Impactool, the device is air operated and applies the torsion bar principle with a shut-off valve.

The tool comes in two sizes: Size 5040T is small, easily handled, and is available with maximum torque of either 60 or 90 ft lb; Size 5340T is factory preset at 320 ft lb, but can be adjusted up to 550 ft lb.

Applications include: Substation and other structural work; maintenance of heat exchangers and similar equipment; and production line work on motors, transformers, and compressors.

In the illustration a Size 5040T unit is running $\frac{7}{16}$-in. cap screws to 45-ft lb torque on rotor fan blades.

Atlanta Office Opened

Texas Co will expand its specialized service to Southern industry by opening a Regional Office of the Technical Service Division in Atlanta, Ga. The new service headquarters will be opened this month at 873 Spring St, N. W. and will be under the direction of J. F. Collins, Jr.

M&M BRIEFS

Okonite Co has established a sales office and warehouse in Syracuse, N. Y., to operate in conjunction with D. K. Post & Co, manufacturers' agent. Walter E. Carrigan (formerly at Pittsburgh) has been appointed manager of this new office.

Pyrene Manufacturing Co and its wholly owned subsidiary, C-O-Two Fire Equipment Co, merged Dec. 30 under the name Pyrene—C-O-Two Corp. This merger of the two fire protection equipment firms was preceded by unification of research, engineering, manufacturing, sales and administration.

Graybar Electric Co has opened a new office and warehouse at 745 East Third St. Lexington, Ky. Lester Samples is supervisor. He is assisted by Lawrence Wester.

Sylvania Electric Products Inc has started construction of a 86,000-sq ft warehouse and sales office on a five-acre site at Gayhart St and Davie Ave, Los Angeles, Calif. Completion is scheduled for May 1. Here will be located regional and district sales and distribution facilities.

Trane Co, LaCrosse, Wis., will take bids during early spring for the construction of a 65,000-sq ft engineering building, advised D. C. Minard, president. The building will provide space for the product and design departments, also a glass-wall enclosure to exhibit a Trane centrifugal compressor for the air conditioning system in the building.

Radio Corp of America has an electronic device which can isolate vibrating machines or cut down their vibration. But more research and development are reported to be necessary before the system is practical for all commercial applications.

Resistance Welder Manufacturers' Association, Philadelphia, Pa., reports continued increase in orders and shipments of resistance welding equipment. Recently compiled report for November places new business for the first 11 months of 1955 at 27% ahead of orders received during the same 1954 period. Shipments for these 11 months have increased 8% over the similar period in 1954.

BUSINESS OUTLOOK

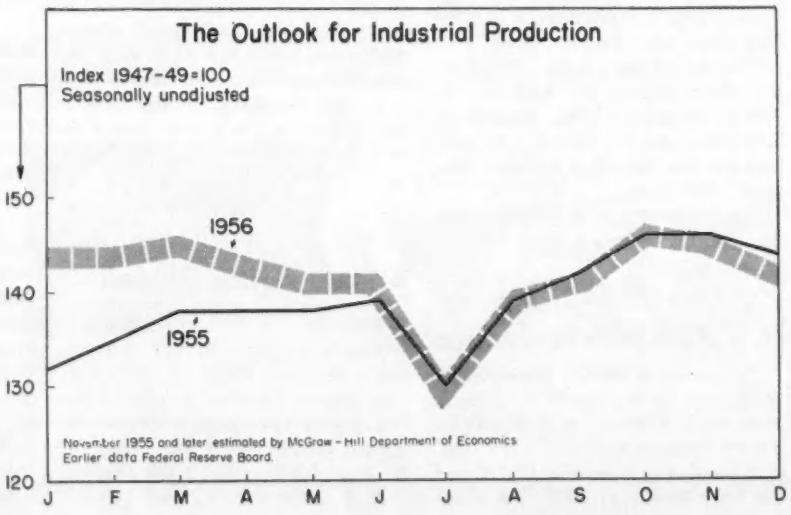
Electrical World
JANUARY 16, 1956

The outlook in brief: **The fall-off in car sales, although anticipated, is creating some jumpiness** in the financial community. It's too soon to say whether this feeling will spread. But **it does raise the question how long the government can keep the credit squeeze going,** in an election year, with two major sectors of the economy, housing and autos, slipping. **We expect to see some credit relaxation, with lower bond yields, before mid-year. But in view of the attitude of the Federal Reserve Board you can't exclude the possibility of one more rise in the discount rate first.**

Latest developments on car sales are wrapped in obscurity. But it's clear that new **car production has finally fallen below year-earlier levels.** And a big decline in new housing starts next spring is foreshadowed by the drop of over a third in applications for government mortgage financing.

What isn't clear is how the Federal Reserve Board is going to react to these developments. **So far their private thinking seems to be that the cutbacks are fortunate since we'd otherwise be having a bad inflation.** In support, they can point to steel, still operating at 100% of capacity, and industrial prices, apparently still inching upward. They know, too, that despite criticism from the experts, tax cuts may prove politically unavoidable. More Federal spending for defense, agriculture, roads, maybe even education, also seems to be in the cards. They are naturally concerned with the inflationary impact of these programs.

So, unless there's a more than seasonal decline in commercial loans, or other convincing evidence that the boom's momentum has been stopped, **we expect there'll be serious consideration given this month to raising the discount rate to 2¾%.** Premium will be on fast action to avoid getting into the political spotlight later. **But our prediction stands that any such action taken now would be reversed before mid-year.**



Cut down these "overhead" costs!

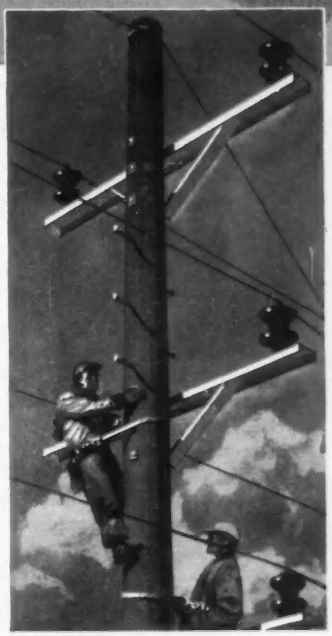
Use pole line hardware that lasts as long as the pole . . . . . made of USS COR-TEN STEEL

Your maintenance budget gets welcome relief when pole line hardware is made of USS COR-TEN Steel.

Because COR-TEN Steel has 4 to 6 times the resistance to atmospheric corrosion of ordinary carbon steel, it takes rust *much* longer to penetrate to a damaging degree. And, since COR-TEN Steel is so much stronger —it has a 50% higher yield point than carbon steel—hardware made with COR-TEN Steel can wear far thinner and still do its job efficiently, without need for replacement.

These two important factors mean that your pole line hardware can confidently be expected to *last the life of a creosoted pole* when it is made of USS COR-TEN Steel.

For a copy of our free booklet, "USS COR-TEN STEEL pole line hardware," and for a list of firms manufacturing pole line hardware from USS COR-TEN Steel, write to United States Steel Corporation, Room 5154, 525 William Penn Place, Pittsburgh 30, Pennsylvania.



SEE The United States Steel Hour. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

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USS COR-TEN High Strength STEEL

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UNITED STATES STEEL

IN THE INDUSTRY

Appliance Price Cuts Mean Bigger Loads

The more appliances the customer can buy for his dollar, the faster the load increases. That is why recent price cuts bode bright future for utilities

Probably nothing in a long time has caused more buzzing in the appliance business than General Electric Co's announcement it would cut prices up to 30% on many of its houseware items (EW, Jan. 2, p7). "GE Action Shakes Industry," headlined one trade paper. "Electric Trade Expected to Follow," said another.

The move seems to have been motivated principally by these factors:

1. GE's ability to produce in volume and thus lower its cost of manufacturing.

2. Its desire to boost sales volume and, as it says, to "broaden the base of its marketing pyramid."

3. Its desire to support fair trade, but at the same time better meet the discounters by setting up more realistic price structures.

With its insistence on fair trade, GE has lost retail outlets in some areas (mainly discounters who fear injunctions for price cutting) and lost sales it might otherwise have had. One industry expert further points out that fair trade has given GE a reputation for high prices on its housewares, an impression that the public has carried over to its other consumer product lines.

A Chance to Beat Discounters

News of the cuts brought mixed reaction from the trade. Distributors see their already thin profit margins sliced even further. Dealers in cities where discount competition is hottest regard it as a better chance to meet discount prices with a top brand name. But, like distributors, those in so-called "clean" cities, those free of discounters, see only smaller margins.

Among discounters themselves, one of the biggest admitted the price reduction is a step in the right direction. But he insisted it would be better to do away with fair trade altogether and let distributors and dealers set prices according to local conditions. This, in effect, is what Westinghouse Electric Corp did last year when it abandoned fair trade on its small appliances.

Sure to Increase Power Use

Regardless of its effect on the middleman, the action can't help but do two things: Broaden the market for housewares, and broaden the use of electric power. W. H. Sahloff, vice president of GE's Housewares and Radio Division, says the cuts represent a step forward in meeting the fast and vast changes taking place in the marketing pattern. "Realistic pricing, cutting costs of operation and selling, increased unit volume, doing business with dollars instead of percentages, and accepting lower margin competition must be the general order of the day," he declared.

"Retailing Daily" said it was following a trend set by autos and food: Volume sales at lower markup. Sahloff, himself, predicted industry sales volume would increase by at least 75% in the next five years and would triple by 1970 making it a $3 billion a year business.

In one form or another, pressures to bring prices down are evident everywhere. While some competing manufacturers played down the price cuts, the general trade feeling is that all eventually will have to take similar action.

Consumers spend only so much of their disposable income on electric appliances (albeit not as much as they should). If lower prices should let them buy three electricity-using appliances for their money instead of two, so much the better for utilities.

TECHNICAL NOTES

Operation testing of air-blast circuit breaker by closing it with the main contacts connected to the trip circuit simulates closing on a fault for a severe check on control and dump valves and the operating linkage.

Solar collector heat pumps can harness 50 to 100% of available solar energy. With supplementary heat energy from outside air, they show promise for heating domestic water.

Bunker storage capacity can be deceptive if only 36 hours of steam plant operation can be derived from a nominal 48-hr volume, part of which is tied up in cloggage.

Ancient theory that tornadoes are related to thunderstorms seems to be confirmed by recent observations that the tornado funnel appears when lightning frequency reaches 14 strokes per sec.

Neoprene-jacketed lead cable, with its splices painted and taped with liquid Neoprene, reduces the drain on zinc anodes installed to control galvanic corrosion.

Low load factor makes large samples (75-80) necessary for customer load surveys to reflect full effect of diversity. Higher load factors drop diversity to the point where a 30-customer sample suffices.

Additional stresses are applied to existing substation structures when frames are extended to support more line takeoffs. Direction of the new lines determines whether the added stresses are bending, uplift, or compression.

Citizens Utilities Pres Rosenthal Announces Unique Equity Program

A unique plan which would permit stockholders to take their dividends in cash or stock will be voted on by shareholders of Citizens Utilities Co. Pres Richard L. Rosenthal has called a meeting for Jan. 27 at Stamford, Conn., to act on the proposal.

The plan calls for reclassifying its present common stock into a Series A, paying stock dividends, and a Series B, paying only cash.

Both will have the same voting rights and all other privileges of the present common stock. Stockholders will have the choice of exchanging their present holdings on a share for share basis for whichever class they desire within 75 days after the ratification of the plan. The U. S. Treasury has ruled that such a transfer is tax free.

Series A stock will remain fully convertible into the cash-paying Series B common at any time in the future, except for period between a declaration of a cash dividend on the Series B and its actual payment. Stockholders may split their present holdings between the two new series of stock in any proportion they choose.

After the reclassification goes into effect, the Citizens Utilities president feels that "at least 50%" of the present common shares will be exchanged for the stock dividend paying Series A.

"As a protection to shareholders," Rosenthal said, "the terms of the proposed amendment to the utility's charter provide that the value of the stock issued as dividends on Series A common will be equated annually to the cash dividends issued on the Series B common. Similarly, no dividends will be declared on either series without the simultaneous declaration of a dividend on the remaining common."

The Treasury Department has ruled, Rosenthal said, that the exemption also applies to any conversion of Series A into Series B which may take place at any time. The stockholder who receives stock dividends on Series A will not be creating taxable income at the time he obtains the stock dividend, he pointed out.

"By instituting this advanced capitalization and dividend policy," he declared, "the utility will benefit both itself and its shareholders. Financing expansion out of retained earnings will enable Citizens Utilities to maintain the equity proportion of its total capitalization at a satisfactorily high level and avoid the disservice to shareholders of dilution from the sale of additional common stock."

Rosenthal strongly believes that investors of all types and income levels will find Citizens' two series common stock capitalization of interest. Investors in high tax brackets, he noted, would logically be interested in the stock-dividend paying Series A.

On the other hand, he declared, corporate, institutional, pension fund, and other trust investors, as well as individuals in lower tax brackets, would find the cash-dividend paying Series B more suitable to their needs.

"By not paying dividends in the conventional cash fashion on the Series A common," Rosenthal said, "we expect that this pioneering arrangement will furnish us with at least $6 million in retained earnings for additional plant expansion and property acquisitions over the next ten years.

"This increase in equity capital," he continued, "will in turn support the

sale of additional bonds in the $12-$14 million range. Thus, without the sale of common stock, which would dilute the interest in earnings of our present shareholders, we will obtain much of the capital we need to keep growing at our ever-increasing rate."

FINANCIAL BRIEFS

Higher Common Stock Dividends—Rockland Light & Power Co will pay Feb. 1 a quarterly common stock dividend of 17½¢ a share as compared with 15¢ a share previously . . . Hartford Electric Light Co will pay Feb. 1 a quarterly common stock dividend of 72¢ a share versus 68¾¢ a share in the previous quarter . . . Shawinigan Water & Power Co will pay Feb. 24 a quarterly common stock dividend of 45¢ a share as compared with 30¢ a share previously.

Union Electric Co of Mo. has sold its wholly-owned subsidiary, St. Louis & Belleville Electric Railway Co to Northern Illinois Coal Corp for an estimated $1,650,000.

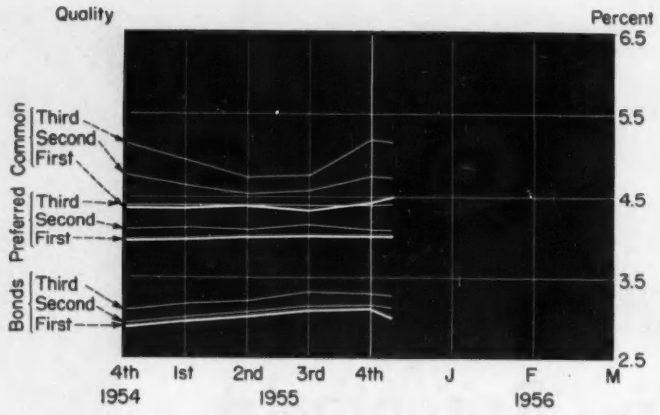
First Boston Corp has issued a booklet "A Tabulation of Electric and Gas Utility Company Common Stocks." For copy, write: George L. Perin, vice president, First Boston Corp, 100 Broadway, N. Y.

In paying $437,108 under protest as its 1955 New Hampshire state franchise tax, Public Service Co of New Hampshire warned in a letter to the State Tax Commission that its electric rates are almost certain to go up again if the tax valuation set by the state survives a court test. Company Pres Avery R. Schiller charged in the letter that the tax demanded by the state is "excessive, illegal, and disproportionate in amount."

Duke Power Co has received Federal Power Commission approval to issue 4,593,480 common shares to its present stockholders on the basis of one new share for each share held. Stock split was approved by the stockholders on Nov. 21, 1955.

Commissioners of Memphis, Tenn., City Utilities Board and City Commission are conferring with Salomon Bros & Hutzler to sell $130 million bonds to build 750,000 kw plant.

Today's Utility Yields (%)



	BONDS			PREFERRED STOCKS			COMMON STOCKS		
QUALITY.....	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Jan. 5.....	3.08	3.13	3.28	3.98	4.08	4.40	4.50	4.76	5.16
Dec. 29.....	3.12	3.16	3.31	3.98	4.08	4.39	4.46	4.77	5.18

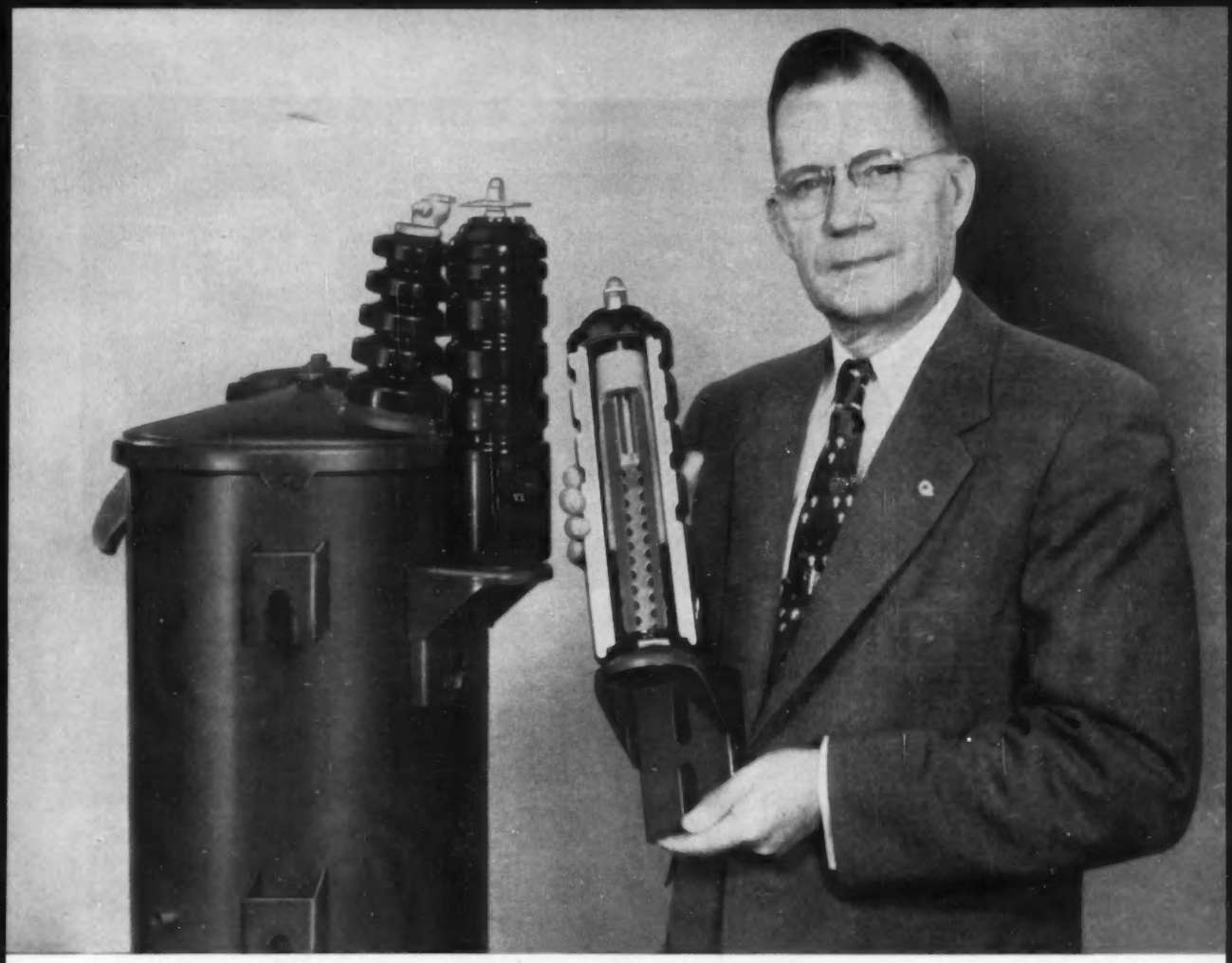
Utility Earnings

COMPANY	PERIOD MONTHS	ENDED	NET INCOME 1955	NET INCOME 1954	EARNINGS PER COMMON SHARE 1955	EARNINGS PER COMMON SHARE 1954
Arizona Public Service.....	12	Nov.	$5,232,000	$4,641,000	$1.39(a)	$1.46(a)
Middle South Utilities, consolidated.....	12	Nov.	16,614,052	16,385,449	2.19(b)	2.16(b)
Pennsylvania Power & Light...	12	Nov.	22,076,581	20,850,740	3.09(b)	2.91(b)
Public Service of Indiana.....	12	Nov.	12,602,445	12,167,926	2.38	2.37
Utah Power & Light.....	12	Nov.	6,783,339	5,763,814	3.06	2.82
Virginia Electric & Power.....	12	Nov.	19,014,919	16,397,578	2.54(b)	2.35(b)
West Penn Electric, consolidated	12	Nov.	17,151,222	15,676,429	2.03	1.85

Notes—(a) Based on average number of shares for the period, and (b) On shares outstanding at end of each period.

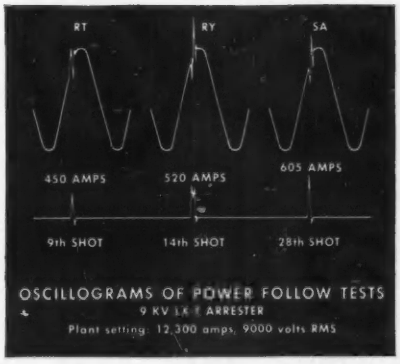
Utility Financing

COMPANY AND DESCRIPTION	AMOUNT OF OFFERING (000)	OFFERING PRICE	YIELD TO PUBLIC
JANUARY 5-11			
PREFERRED STOCK			
New Orleans Public Service—60,000 sh 4.36% $100 par.	$6,000	$102.58	4.25%
SCHEDULE FOR JANUARY—FEBRUARY			
BONDS			BID DATE
Central Power & Light—1st mtg due 1986.....	$10,000	.....	Feb. 14
Pennsylvania Electric—1st mtg due 1986.....	25,000	.....	Feb. 15
Dallas Power & Light—1st mtg due 1986.....	10,000	.....	Feb. 15
Kansas Gas & Electric—1st mtg due 1986.....	7,000	.....	Feb. 27
Texas Electric Service—1st mtg due 1986.....	10,000	.....	Feb. 28
PREFERRED STOCK			
Pennsylvania Electric—90,000 sh.....	$9,000	.....	Feb. 15
COMMON STOCK			
Atlantic City Electric—75,000 sh.....	.....	.....	Jan. 24
Texas Utilities—400,000 sh.....	.....	.....	Jan. 31
Southern Indiana Gas & Electric—83,030 sh (to be offered commonholders on 1-for-11 basis, record Feb. 21 to expire Mar. 8, with no oversubscription privileges).....	.....	.....	.....
Kansas Gas & Electric—200,000 sh.....	.....	.....	Feb. 27



W. A. Sumner, Manager, Distribution Transformer Engineering, explains this

FACT: New Valvex expulsion arrester has greater current-limiting ability



Inherently dependable, the new LX-T retains the time-proved features of De-ion® expulsion arresters . . . large surge-current ability, low discharge voltage, long life, and ability to handle surges at 60 cycles overvoltages. Now it also incorporates new, low, spark-over voltages with greatly increased current-limiting ability for dynamic current on repeated tests at maximum severity.

It's another feature that spells more for your transformer dollar when you buy Westinghouse.

• • •

Get the facts from The Man With The Facts, your Westinghouse Sales Engineer. Or write direct to Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa.

J-70737

YOU CAN BE SURE...IF IT'S

Westinghouse

STATISTICS

Plant and Equipment Expenditures Maintain Business Boom

(Billions of Dollars Seasonally Adjusted)

	1954				1955				1956
	Jan.-Mar.	Apr.-June	July-Sept.	Oct.-Dec.	Jan.-Mar.	Apr.-June	July-Sept.	Oct.-Dec.†	Jan.-Mar.†
Manufacturing	11.62	11.09	10.98	10.58	10.17	10.84	11.97	12.64	13.44
Durable	5.40	5.18	5.06	4.80	4.78	5.06	5.77	6.23	6.80
Nondurable	6.22	5.90	5.93	5.79	5.39	5.78	6.20	6.41	6.64
Mining	.94	1.04	1.00	.91	.80	.94	.99	.97	.95
Railroads	1.04	.91	.80	.68	.74	.80	.96	1.15	1.41
Transportation, other than rail	1.57	1.44	1.51	1.53	1.46	1.62	1.60	1.66	1.64
Public utilities	4.33	4.37	4.12	4.01	4.01	.09	4.43	4.70	4.52
Commercial and other	7.97	8.07	8.42	8.46	8.46	8.90	9.70	9.74	9.64
Total	27.46	26.92	26.84	26.18	25.65	27.19	29.65	30.86	31.60

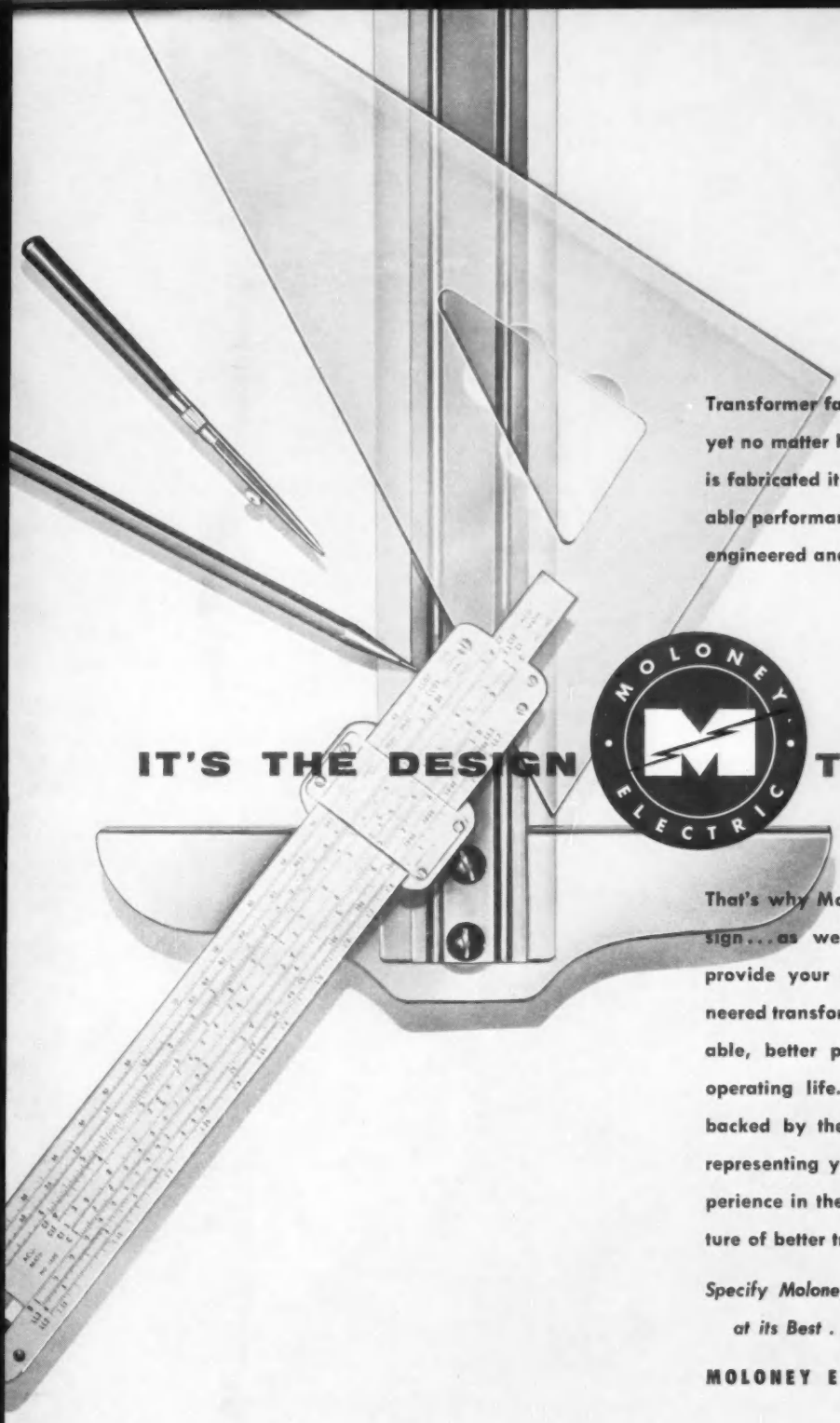
†Estimates based on reports from business in late October and November. Source: U. S. Department of Commerce.

Power Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity	Oct.	112.13	110.91	100.01	12.1
Peak—Class I Systems	Oct.	90.6	90.1	79.9	13.4
Estimated Dec. '55 Peak	Oct.	96.72	96.82	96.21	0.5
Estimated Dec. '56 Peak	Oct.	104.34	104.31	102.85	1.4
Production—billion kwhr	Oct.	47.37	46.33	40.46	17.1
Hydro		8.77	8.17	7.83	12.0
Fuel		38.60	38.18	32.63	18.3
Sales—billion kwhr	Oct.	43.16	43.51	36.18	19.3
Residential		10.33	10.58	9.36	10.4
Commercial		6.87	7.36	6.32	8.7
Industrial		23.45	22.84	18.14	29.3
Other		2.51	2.72	2.36	6.4
Fuel Consumption	Oct.				
Coal—million tons		12.66	12.07	10.34	22.4
Oil—million barrels		6.04	5.18	5.32	13.5
Gas—billion cu ft		104.75	120.17	108.60	−3.5
Net Income Class A & B Co's—$ million	Oct.	95.67	100.23	86.80	10.2
Residential Customers—millions	12 mos.	44.21	44.10	42.94	3.0
Revenue per kwhr	ended	2.65¢	2.66¢	2.70¢	−1.9
Avg kwhr per customer	Oct. 31	2,715	2,698	2,513	8.0
Avg annual bill		$71.95	$71.77	$67.85	6.0

Business Statistics . . .

Indexes: 1947–49 = 100					
FRB Industrial Production	Nov.	144	143	128	12.5
ENR Construction Cost	Nov.	141.1	141.2	134.7	4.8
BLS Cost-of-living	Nov.	115.0	114.9	114.6	0.3
NEMA Sales	Oct.				
Insulation materials		156	156	117	33.3
Electric appliances		118	131	102	15.7
Household refrigerators		64	85	51	25.5
Wholesale prices	Nov.				
Motors and generators		127.0	125.2	121.7	4.4
Transformers and regulators		129.2	129.2	128.1	0.9
Switchgear and fuses		146.2	146.1	135.3	8.1
GNP—annual rate—$ billion	3rd Qtr.	392.0	384.8	358.8	9.3



Transformer fabrication is important, yet no matter how well a transformer is fabricated it can't provide dependable performance unless it's properly engineered and designed.

IT'S THE DESIGN THAT COUNTS

That's why Moloney emphasizes design . . . as well as fabrication . . . to provide your utility with well-engineered transformers that give dependable, better performance and long operating life. You get all this . . . backed by the Moloney Trademark, representing years of pioneering experience in the design and manufacture of better transformers.

Specify Moloney . . . Get Dependability at its Best . . . All Along the Line

MOLONEY ELECTRIC COMPANY

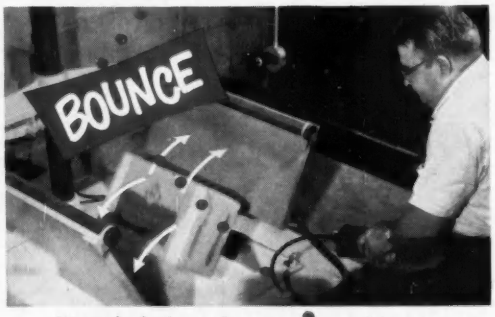
ME95-51

Power Transformers • Distribution Transformers • Load Tap Changing Transformers • Regulating Transformers • Step Voltage Regulators • Primary Unit Substations • Secondary Unit Substation Transformers • Network Transformers • Series Street Lighting Transformers • Subway Transformers • Industrial Dry Type Transformers • Capacitors • Magnetic Components for Electronics

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

NEW Transformer Obstacle Course

On this vibrating table, crated distribution transformers are tested for railroad car and truck vibrations. Equipment simulates varying speeds, irregularities in road or track, and natural frequency of truck springs.



Hinged platform drops packaged instrument transformers to steel plate from various heights. Package is positioned at desired angle of impact to test all edges and faces.

Assures Safe Shipment by Pretesting Package Design

At Allis-Chalmers, quality control doesn't end until the transformer shipment arrives at your door. An example is A-C's *new* equipment for simulating transportation conditions. It has a threefold benefit:

1. Provides information on safe crating and boxing.
2. Produces useful facts on improvement of transformer design.

It's assurance that transportation rigors will not affect transformer performance.

Previously A-C engineers traced test shipments over the country. This was time-consuming, but out of it came important results like A-C's floating load method of shipping transformers in 1952, and the pallet-bonus crate introduced by Allis-Chalmers in 1954.

But now, with this *new* shock-test equipment, results can be had faster and more accurately than before. Now, every newly designed transformer is shock tested in order to check its mechanical strength and prove the design calculations. At the same time, this "road test" checks the crate design for possible improvement.

A-4903

Impact test is equivalent to free drop to ground from back of truck or railroad car. Packaged unit slides down incline from a release point selected to produce impact equivalent to 9 G's . . . nine times acceleration of gravity. Shock recorder on crate measures initial impact.

Look for the seal on A-C transformer shipments which certifies approval by National Safe Transit Committee.

Allis-Chalmers complete package-testing program is just one of many steps A-C takes to produce better distribution transformers. It will pay you to get complete information. Why not call your nearby A-C office today? Or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS